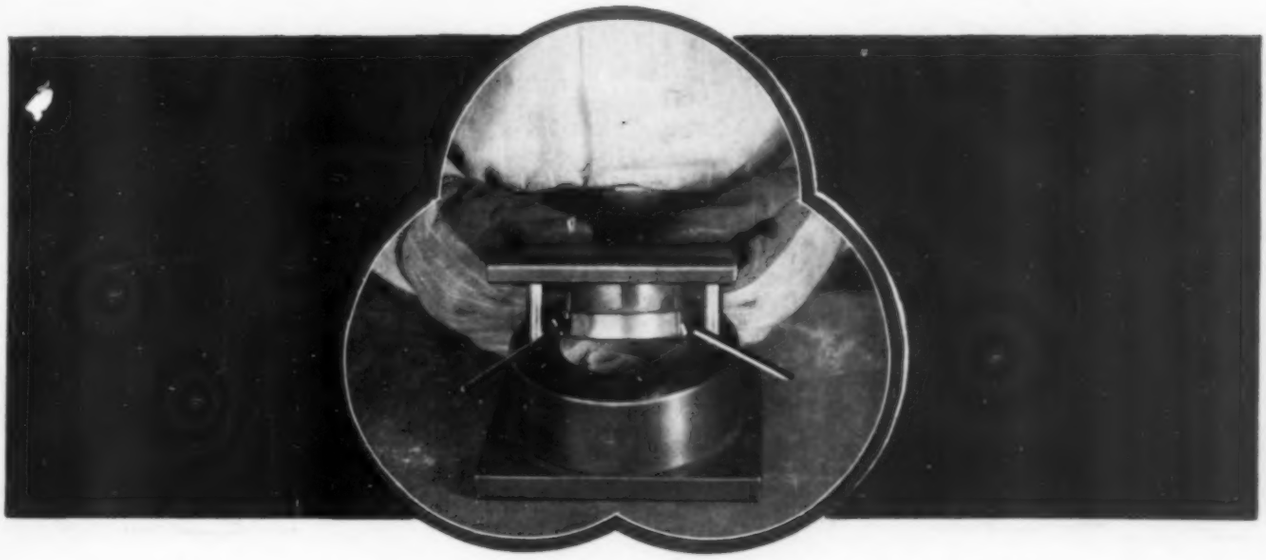
Bureau of Standards
JAN 21 1929

PLASTICS

A Periodical Devoted to the Manufacture and Use of Composition Products

DECEMBER, 1928



Positive type mold with a force having free sliding fit in chase and sprue grooves to allow for escape of gases

"Breathing" the Mold to allow for escape of Gases

IN molding phenol resin materials gases are given off under the heat and pressure of the molding operation. If a ready escape is not provided for these gases the molded piece is apt to have interior gas pockets and surface blisters.

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This advertisement is the fourth of a series in which we are featuring a few fundamental rules of plastic molding. Although obvious to many, we find they are frequently overlooked resulting in a loss of both time and money to the molder. By calling attention to some of these simple rudiments Bakelite Corporation hopes to give its customers the benefit of its long experience in its endeavor to advance the art of plastic molding. Enlargements of these advertisements have been made so that they can be placed on the bulletin boards in your Molding Rooms. Copies may be had upon request.

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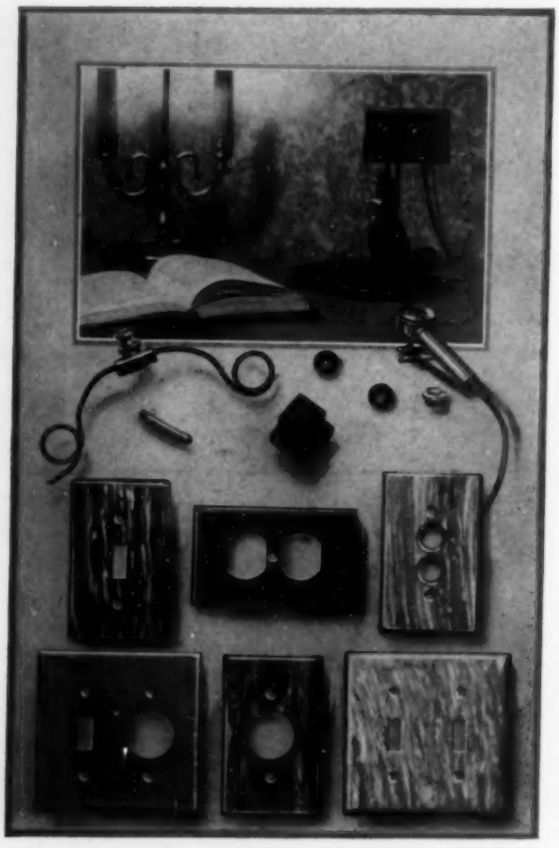
Molded Products See Page 695



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KAROLITH

PLASTICS, Vol. IV, No. 12, December, 1928. Publication office, 49 E. Washington Avenue, Washington, N. J. Executive office, 114 E. 32nd Street, New York City, N. Y., by The Plastics Publications, Inc., R. C. Gilmore, Jr., President. Subscription price, Domestic $3.00 per year, 35c per copy. Foreign and Canada, $4.00 per year. Entered as second-class mail at the Post Office at Washington, N. J., under the act of March, 1879, and copyright, 1928, by The Plastics Publications, Inc.

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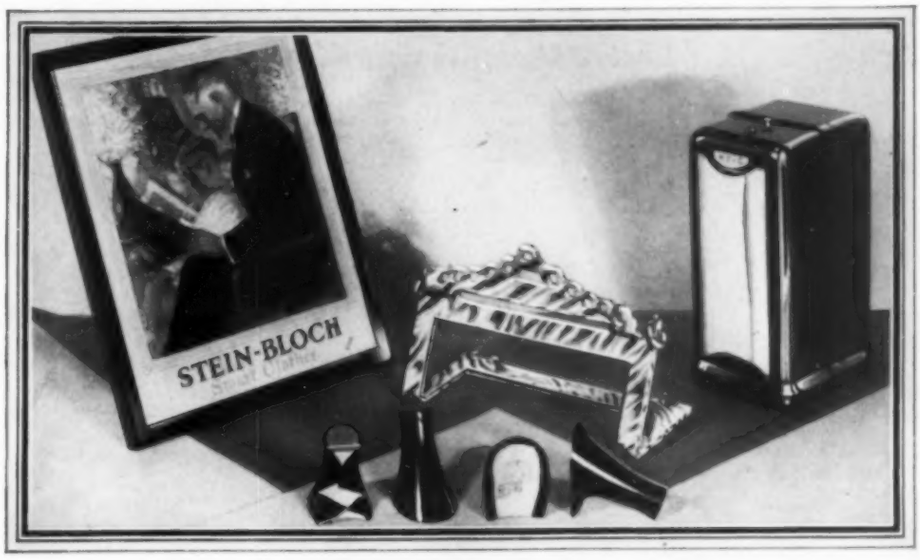

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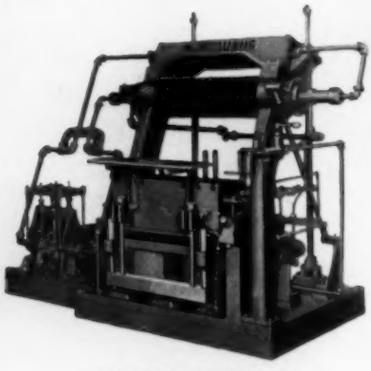

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NOTE HOW HEAD OPENS LIKE A BOOK

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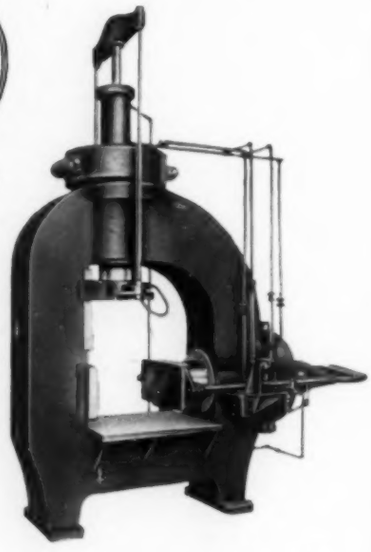
Angle Moulding Press
(Patented)



Angle Moulding Press
(Patented)

Rodless Type for Production moulding with direct heated and chilled moulds for moulding pieces requiring split dies.

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Established 1869

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IT seems to us that the Molded Insulation section of N. E. M. A. is approaching the delicate question of trade equity with unquestioned diplomacy, which has already started it on the road to success. The Federal Trade Commission is the only impartial clearing house for an almost unlimited number of trades, and its benefits have been noticed in every branch of public life. To present the Commission with the problems of the Molding industry does not mean that the Commission will solve those problems; that is the duty resting on the industry itself. It does mean that the industry has at last acquired an official voice toward unfair practices. It is a problem that is little understood by the majority even though it is to their interests to understand it. The December 13 issue of Printers Ink, published at 185 Madison Avenue, has an extremely interesting an enlighting article based on former Chairman Humphrey's remarks at the convention on December 6, of the American Face Brick Association. Mr. Humphrey says, in part:

"The Commission not only assumes the omnipotent power to make laws but also the power to enforce them. We are the legislative—the judiciary—and the executive. We supersede Congress, and the Courts, and the President . . . !"

We commend the entire article to the attention of our readers.

In this, the Christmas issue, are several articles and statements that reflect both the past and future lines of PLASTICS endeavors. We call our readers particular attention to the following pages: 674, 702, 706, 700, 708 and assure them that other articles as well are worthy of careful consideration.

To its wish for increased business prosperity, PLASTICS adds the seasons greetings of its combined staff, with the hope that the New Year will bring a deserved feeling of business stability and a greater desire for cooperation.

The Publishers

PLASTICS
& MOLDED PRODUCTS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 4 DECEMBER, 1928 No. 12

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Factory: Bainbridge, N.Y.

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PLASTICS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 4 DECEMBER 1928 No. 12

The Rise of The First Great Plastic Industry

The historical side-lights on the origin and growth of the Celluloid Corporation

By Carl Marx

Editor of Plastics

SOME of our readers, who have been subscribers of PLASTICS since its early days back in 1925 and 1926 may recall the series of articles that we then brought to their attention, entitled "With the Pioneers." At that time (1926, Vol. 2, pp. 9. 49,86 and 130) we gave short biographical sketches of the men that originated the earliest of the plastics as we know them today, and of some of the inidents and difficulties that beset them in the early pioneering days of the Pyroxylin Plastics. The last of these articles was a biographic sketch of John W. Hyatt and his work in the discovery of the fundamental principles that led him to the invention of Celluloid in 1868, or just sixty years ago. It is most fitting that this sixtieth anniversary of one of the most important plastic materials should be remembered appropriately, and we have therefore decided to go somewhat into the history of the organization that, starting with small means and with enormous difficulties in 1869, and weathering many a storm during its sixty years of existence, has eventuated in the huge plant and business of today. Much of the material used in the preparation of this article has never before been published, and will make, we are sure, interesting reading. It is our hope that the publication of this article, and some of the future ones along the same line, will induce others to unburden themselves of their early reminiscences, so that we will be in the happy position of recording for the future generations some of the achievements of the pioneers in the Plastics Field.

THE early history of the Hyatt Brothers, John Wesley and Isaiah Smith Hyatt, has often been told, and the invention of what has become known the world over as Celluloid has been most justly attributed to John Wesley Hyatt. John W. Hyatt was awarded the Perkin Medal in 1914 by the Society of Chemical Industry, a British organization, and Mr. Hyatt at that time gave a most entertaining account of just how he made the first piece of Celluloid ever produced. As this story has, however, already been told in our pages, we will refer our readers to page 130 of the 1926 volume of our journal and devote our attention to the development of the commercial side of the business, about which not very much has ever been printed.

Whilst the Celluloid Corporation of today is a huge and prosperous organization, it had its origins in humble beginnings, and the financial difficulties, and the prejudices of the public, that had to be met and overcome were no mean tasks, and a great deal of credit is due the men whose foresight, tenacity and optimism made a success of such a startling new industry as that of Celluloid. It must be remembered that Celluloid was made from what the world then knew as "Guncotton," and that the same material was used in explosives. No one can doubt that it took real courage to undertake to manufacture this material on a large scale, and with such remarkable success.

Early Beginnings

When one looks back over the achievements of the various organizations that have culminated in the Celluloid Corporation of today, one finds difficulties that are strikingly like those that met the introducers of other new plastic materials, such as Galalith (Casein) and Bakelite. In each of these cases the inventors had to convince the public that they really had something new and worth while and that the material was useful for a

great variety of purposes. At first Celluloid was almost exclusively applied to billiard balls, and dental plates and it was not for many years that the immense variety of articles now made from this most versatile material became popular.

While there is no doubt that John W. Hyatt invented the process of making Celluloid by blending camphor and pyroxylin under heat and pressure during the Fall and Winter of 1868, there is also no doubt thai tt was his brother Isiah Smith Hyatt, almost universally referred to as I. Smith Hyatt, who coined the name. That, it must be admitted, was also a mighty important factor in popularizing the material, and although the name has been trade-marked since Jan. 14, 1873, it has in truth become a household word throughout the world.

At this point it must be said that for a time there was great prejudice against the material because of its ready inflammability, but the manufacturers very wisely retained the name in the firm conviction that the prejudice would eventually be overcome. They guessed rightly, for seldom has so radically new a material gained so firm a foothold on an industry, so that after fully sixty years it is still the most important of the available plastic materials, combining in itself properties that thus far no single other plastic material has exhibited, namely thermoplasticity (being indefinitely moldable under heat, and capable of re-shaping), transparency and exceedingly great elasticity. Nothing has been found to take its place for the trillions of miles of motion and talking-picture film, for example.

Mr. John H. Stevens, who enjoys the unique distinction of being present at the actual "birth" of Celluloid, and who still is enjoying good health, having recently retired from many years of active association with the Celluloid Co., is authority for the statement, made in a letter to President Marshall C. Lefferts of the Celluloid Co. at the time (1921) that the word Celluloid was invented early in 1870, surely before July 12th of that year, being known and used immediately thereafter by at least dozens of people, especially those associated with the Hyatt brothers.

In the same letter (April 7, 1921) Mr. Stevens gives some other interesting descriptions of the very first plant at Albany where Celluloid was made. John

A photograph, on ivory, of John W. Hyatt, reprinted with permission of the Celluloid Corporation.

W. Hyatt had at that time already organized a company that was molding billiard balls out of a shellac compositions, and his earlier work had been on coating such molded billiard balls with a composition that closely resembled collodion (a solution of pyroxylin in ether-alcohol), so that he was familiar with the various types of cellulose nitrates. After he had made the epoch-making discovery that camphor would dissolve and blend with pyroxylin under heat and pressure, without the actual need of a solvent, (see 1926 Plastics, p. 130) he realized the need of financial assistance. This was forthcoming by the arrival from the west of his brother I. Smith Hyatt. According to Mr. Stevens, who witnessed all these experiments and early development, the first experiments on the commercial production of Celluloid were made at the Albany Billiard Ball Co. factory on Beaver Street, in Albany. It seems that the first commercial article made was a dental plate, and that this came from the crude press then used when I. Smith Hyatt, and not John Wesley Hyatt was present, although the latter had given all the instructions. Mr. Stevens had, under the previous direction of Mr. John W. Hyatt gotten rid of the water in the pyroxylin by pressing the mixture of powdered camphor and pyroxylin between blotters, and this mixture was put into a heated dental plate die by I. Smith Hyatt and subjected to pressure. After the die was cooled, Hyatt took it out and when scrutinizing it and testing it for solidity suddenly became very animated and cried out to Stevens, who was present: "Eureka. Johnnie, we've got it; we've got it." Shortly after that, early in July, he came to Stevens and said "I have invented a good name for the new material. I call it "Celluloid." And thus it received its historic name.

The first commercial success came soon after. It was found that the new material was eminently suited for the manufacture of dental plates, and a company known as the Albany Dental Plate Company was organized in 1870. Several months were occupied in actual manufacture of dental plates before it was announced that still another company had been formed to make and apply the Celluloid in a wider field. About the only machinery in the plant on Beaver Street, where the Albany Dental Plate Co. had its abode, was a hand driven stuffing machine with dies that received the material and gave it its final shape as it entered into them from the nozzle of the stuffer.

Finding that the material undoubtedly had much wider utility the Celluloid Manufacturing Company was organized. There is reproduced here an old letter-existts an old letterhead of this concern, which is dated 1871,

showing that it was located at 151 Eagle Street, Albany, N. Y. This will set at rest so many of the claims that it was in Newark, N. J. that the company had its origin. This letter head also contains the original formulae used for the dental plates, and is an interesting relic of the real early days of this industry. It is interesting to note that even at this early date, some alcohol was added to the camphor to reduce its melting point and to assist in its incorporation with the camphor. The formulae are interesting: for example the color was due to a mixture of vermilion with zinc white. A dental plate formula given on this letter head is

Soluble cotton, 30 lbs.
Camphor, 10 lbs.
Dry zinc (Oxide), 15 ozs.
Deep vermilion, 45 drams.
Prussian blue, 3 grains.
Alcohol, 5/13)of the weight of the cotton).
(which would be about 14 lbs.).

Other formulae showed 15 lbs. of alcohol to 30 lbs. of "soluble cotton."

It soon became apparent that the dentists themselves became even more adept in fashioning the new plates than the company so that the latter confined itself to the selling of raw material, in sheets, to the dentists.

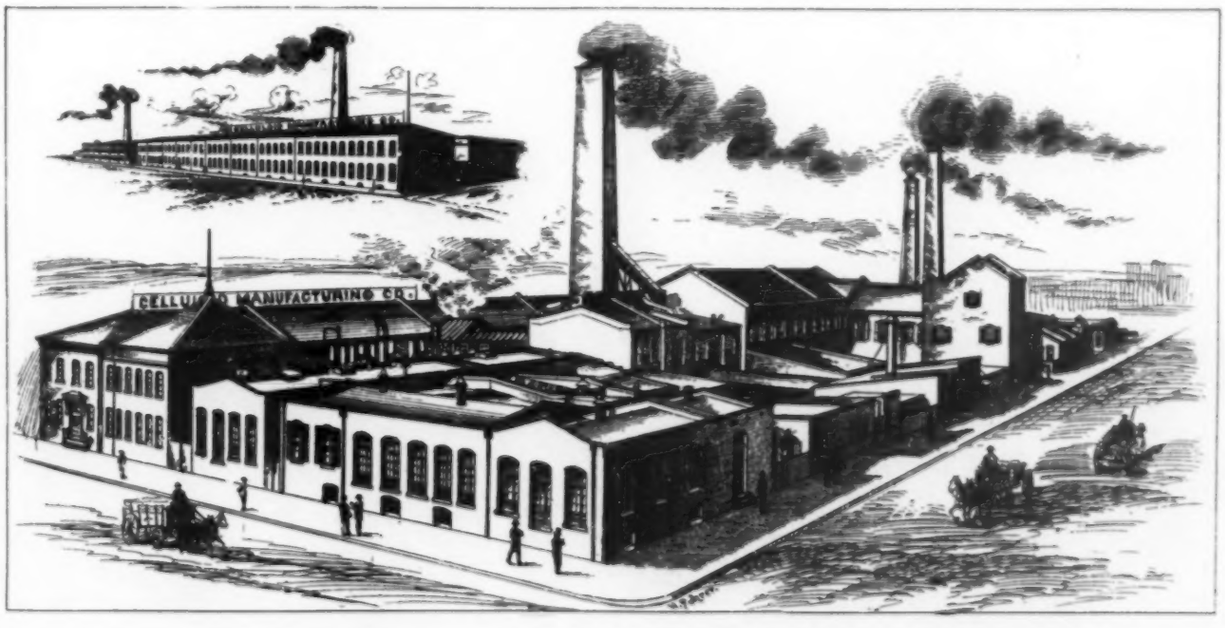
It is said that the two Hyatt brothers were very deeply attached to each other, and that John W. frequently tried to give most of the credit to his brother I. Smith. The latter was a man of great culture and erudition, whilst John W. was the inventive genius and was possessed of exquisite mechanical skill, clear constructive thought and strong tenacity of purpose. The brothers undoubtedly were a good team, and each supplemented the other's abilities.

The development of the Celluloid organization dates therefore from the first "Celluloid Manufacturing Company" which was organized on January 28, 1871 with a capital of $60,000.00, and which purchased the premises for a factory at 151 Eagle Street, Albany in May 1871 for $7,000.00.

Later the capital of the company was increased, viz:—March 4, 1872 to $66,000.00; Aug. 20, 1872 to $225,000.00; September 23, 1873 to $500,000.00 and on September 28, 1887 to $600,000.00. Of this total of six hundred thousand $115,800.00 was issued for cash at par, $50,000.00 to purchase the business of the Albany Dental Plate Co., and $334,200.00 to the Hyatts for their patents etc. Of this latter amount it is probable that a considerable part was turned back into the treasury as fully paid stock, to be resold or used as a bonus with the treasury stock.

The earliest balance sheet in existence is that of April 8, 1873, something after a year from the actual commencement of manufacture, and shows cash assets of $4,087.96; Inventories $7,612.56, plant $42,825.45 with outstanding accounts due at $12,525.97. Early in 1872, recognizing the necessity of more capital and experienced business management, the business was brought to the attention of General Marshall Lefferts and on August 20, 1872 he was elected President of the company. He shortly afterwards interested several of his friends in the company, among whom were Mr. Joseph Larocque and Mr. Tracy R. Edson. It was then immediately decided to move the factory and business to a more accessible location.

(*Continued on page 684*)



This old sketch, made in 1889, and reprinted with permission, shows the Celluloid Manufacturing Company plant in Newark, N. J.

Composite Mica Products

Recent patent history of an active and highly useful art. Mica articles find widespread and important applications

By Joseph Rossman
B. S. in Chem. Eng., LL. B., M. P. L., M. A.

THE past ten years have brought quite a number of inventions in the manufacture of mica articles. Continuing from p. 623 of the November issue we find the following:—

Concluding the interesting review of the United States Patents on the production of various kinds of molded and composition mica devices and products.

37. Edgecomb 1,239,894, September 11, 1917.

A process of manufacturing insulating sheet material that comprises distributing a shower of commingled mica flakes and a comminuted dry bond upon a continuously moving metallic surface, applying heat and pressure to the said material while it is carried by the said surface, severing the said material into sheets and thereafter subjecting the severed sheets to cold pressure.

38. Meirowsky 1,241,539, October 2, 1917.

The process of treating mica in bulk for the separation and delivery of single flakes or sheets therefrom, which consists in revolving the mass for the separation and removal of the finer or useless particles therefrom, and subsequently revolving the remainder in si tu in a manner, whereby the flakes or sheets are separated and delivered singly.

39. McCulloch 1,286,043, November 26, 1918.

The process of making composite insulating material composed of mica and a binder which comprises arranging and superposing mica flakes coated with a paste of bentonite and water, pressing the assembled material and drying the resulting product.

40. Sweet 1,320,509, November 4, 1919.

The method of making articles from mica fragments which comprises distributing between successive layers of fragments lead borate, and subjecting the laminal body to mechanical pressure and sufficient heat to fuse the lead borate, said borate being so applied that after heating said fragments will be united at intermittent points of attachment.

41. Mosler 1,320,637, November 4, 1919.

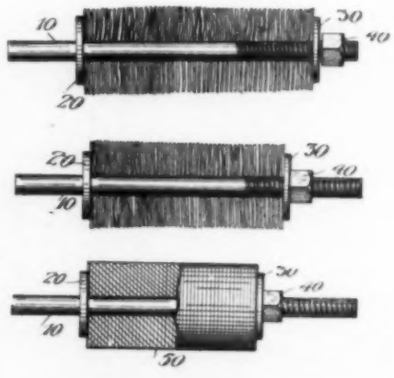
The method of producing mica insulators for spark plugs consisting in stringing on a core rod more disks than are needed for the insulator length desired, submerging the same in a tank of resinous liquid, such for instance as shellac varnish, removing the stack from the tank, subjecting the stack while wet to great endwise pressure, removing the core rod, drying the stack at a low heat while compressed, to form a unitary body, removing the pressure, and severing from the stack the length desired by the insulator.

42. Mosler and Margolin 1,320,638, November 4, 1919.

The method of producing mica insulators for spark plugs consisting in wetting mica disks with a volatile liquid, such for instance as alcohol, compressing the disks while wet, drying the same while compressed, to form a unitary body, and severing therefrom the length desired for the insulator.

43. Patton 1,338,393, April 27, 1920.

A resilient flexible composition of matter comprising comminuted mica and an unvulcanized binder of elastic material with which the particles of mica are coated, said binder being present in amount only approximately sufficient to cause the particles of such comminuted mica to adhere to each other, such binder being adapted, at ordinary temperature, to form with the mica a resilient composition without the application of heat or vulcanization.



How a composite mica core for resistance elements is built up. U. S. P. 1,340,812

44. Bernard 1,340,812, May 18, 1920.

A process of making insulators consisting in arranging a plurality of mica sheets each containing a coating consisting of gum and rosin upon a supporting bar, repeatedly subjecting the mica sheets to heat and pressure whereby the gases from the coating of gum and rosin will escape and the mica sheets reduced to a solid consistency and then turning the resultant solidified mass on a lathe, to provide a continuous spiral groove for the reception of the resistance element.

45. McCulloch 1,386,008, August 2, 1921.

A process of making composite material that comprises associating flake material with a binder formed by mixing boric acid, water, glycerin and a pulverulent filler, and heating the superposed flakes or splittings to a temperature not exceeding 500°C.

46. Peterson 1,386,896, August 9, 1921.

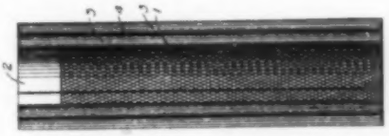
The process of assembling flake material in sheet form which consists in creating a partial vacuum at one side of a foraminous screen with a confined space at its other side; causing a swirling stream of air, of sufficient velocity to carry the flakes in suspension, to be sucked into said confined space from the surrounding atmosphere; and uniformly supplying flake material to said confined space to be carried along dispersed in said swirling stream of air and automatically distributed over the screen in a uniform layer.

47. Kempton 1,416,036, May 16, 1922.

A method of insulating objects which comprises winding a plurality of superimposed convolutions of impregnated sheet material about the object, surrounding these windings by mica, then winding another series of superimposed convolutions of impregnated sheet material about the mica and molding the body thus formed.

48. Frederick 1,454,274, May 8, 1923.

The method of forming mica board consisting in floating mica flakes in suspension prior to settling upon successive building plates subsequently binding the building plates with the mica flakes therebetween, and finally treating with an adhesive solution.

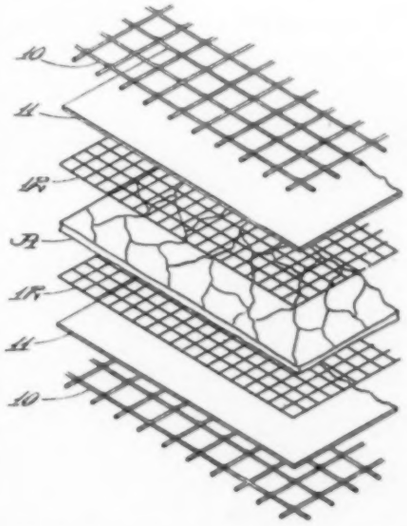


U. S. P. 1,416,036 shows alternate layers impregnated fabric and mica all wound on a mandril and molded into one piece.

49. Dawes and Boughton 1,578,812, March 30, 1926.

The method of producing insulating bodies, characterized by association of mica fragments with a binding material comprising an alkali-metal metaphosphate with an admixture of relatively heat-refractory alkali-metal salts, raising the temperature of the associated materials to a degree below that at which mica disintegrates, and applying pressure to the materials adequate to make the binding material flow at that temperature.

50. McCarthy 1,588,600, June 15, 1926.



U. S. P. 1,588,160 shows use of wire mesh to prevent sticking of the mica sheets to the press when molding.

The method of preventing sticking of work to adjacent press elements which consists in interposing a sheet of relatively fine mesh wire screen cloth between each press element and the work and in engagement with the latter and interposing between each sheet of screen cloth and the adjacent press element a resilient metal sheet of relatively coarse mesh wire screen cloth.

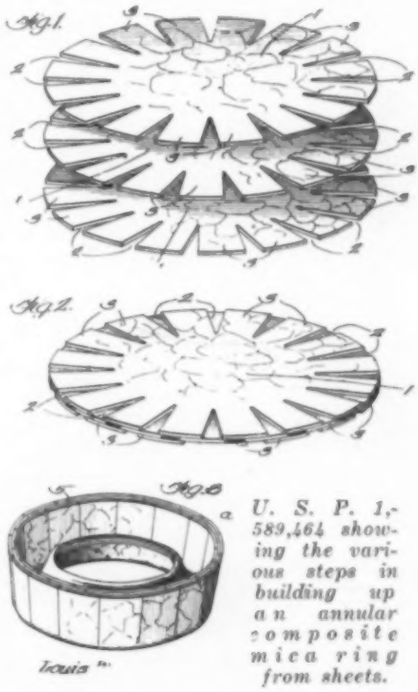
51. Barringer and Peterson 1,589,094, June 15, 1926.

A laminated article comprising flakes of mica superimposed upon each other and bound together with an infusible, insoluble resinous compound of glycerine and phthalic anhydride.

52. Frederick 1,589,464, June 22, 1926.

The method of producing flanged insulating bodies consisting in preparing a plurality of circular blanks of mica plate, cutting sector shaped slots at spaced intervals in the periphery of the blanks, arranging the blanks in a pile with the sectors out of register, heating the material to render it plastic, and while the material is plastic forming an annular flange in the

(*Concluded on page 685*)



U. S. P. 1,589,464 showing the various steps in building up an annular composite mica ring from sheets.

PLASTICS Past and Future

PLASTICS had its inception in October 1925. The thought uppermost in the minds of those who created this paper was to provide the thousands of workers in the field of those modern industries in which materials were shaped under heat and pressure, with a monthly medium that would keep them abreast the times. Such a publication would apprise them of all the progress, both technical as well as commercial, that was being realized.

From the outset our aim has been to provide that news of the industry and the materials employed in it which would have a *permanent* file value. PLASTICS aims to be more than a mere monthly "newspaper" of the Plastic Industry. Its guiding purpose is to be a meeting place of minds, a central storehouse and exchange medium of ideas and of authoritative information.

The United States has wisely provided for the reward of inventors by granting them valuable patent rights, and this country, perhaps more than any other realizes the full importance of Patents. So, we have given, and shall continue to give, considerable attention to this phase of development of Plastics, as well as to materials, process and methods, and also to the new uses of the substances that have been created by the inventive genius of our age.

Plastics and Molded Products is the only periodical of its kind printed in the English language. With a full realization of the significance of the art as it has developed in the past, before it had such a medium, we have been liberal in providing condensed reviews of various special phases of both patent and technical subjects, with the almost unanimous approval of our readers.

We made PLASTICS; we are responsible to our readers and know on good evidence that we have undertaken something that already has a permanent place in the literature of industrial technology. We have provided those who supply the wants and needs of this industry with a means of reaching the precise public that is most likely to buy their wares. The constant growth of the volume of advertising has been a splendid testimonial to the fact that our advertisers have found that it paid them to avail themselves of our pages.

For 1929, Volume 5 (our fourth year), we expect to enlarge our scope by reviewing all of the pertinent foreign literature on the subject of the manufacture and utilization of Plastics Materials. We will thus make available for those of our readers who have neither the time nor inclination to wrestle with a foreign language the literature of those nations whose progress in Plastics is an incentive to our own development. Correspondents in foreign countries will scan the possibilities for new outlets for our own manufacturers, and keep a sharp lookout for new sources of materials and new ideas that can be turned into profits.

As our readers desire the PLASTICS section will be kept more or less in the same technical channel it was intended to pursue. In the MOLDED PRODUCTS SECTION, we shall widen the horizon of our endeavors by a series of educational articles that will enlighten the prospective user of plastic and molded materials. These will make him so familiar with the utility and advantages of these products that he will be less of a sales problem to those who offer him molding service or completely molded products.

As our circle of readers continues to grow and to take in new fields, the possibilities of acquainting those who should but are not yet using materials produced by plastic molding, is bound to increase.

PLASTICS AND MOLDED PRODUCTS is not a newstand magazine, and the only way to insure getting copies regularly is to subscribe. We have purposely kept our subscription price as low as possible. This is so that each and everyone, large or small, who is interested in this new industry with sound growth and improvement ahead, may avail himself of the service we shall continue to keep in action for the benefit of his work, production, research and sales. This will be the continued purpose of Plastics, for you, and we ask your co-operation.

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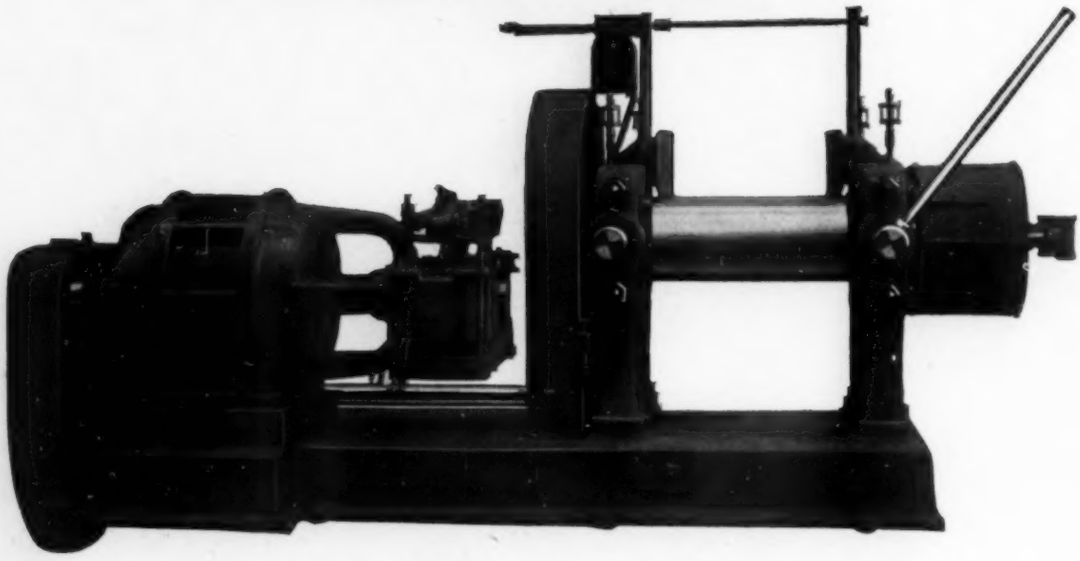

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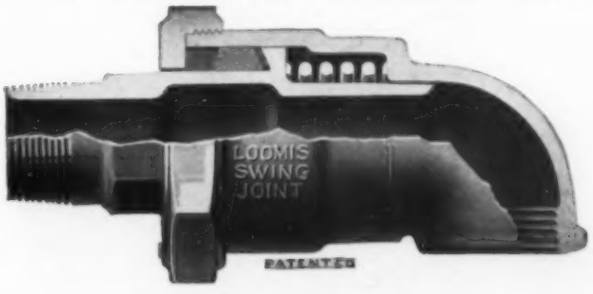

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Recent Contributions By Leon Lilienfeld to the Field of Cellulose Chemistry

Preparation of cellulose thiourethanes and xanthimides. New compounds may solve important problems in plastics, films, filaments and lacquers

LEON LILIENFELD is well known to all workers in the field of the cellulose compounds. It was primarily his work that led to the perfection of the compounds known as the cellulose ethers. These differ from cellulose esters in that, in the case of the ethers, the cellulose molecule has added to it groups of aliphatic radicals, such as the ethyl or methyl (or similar) radical. If only a few of such radicals are added to the cellulose, then in some instances water-soluble products result, but when the introduction of the ethyl or methyl radicals reaches from 4 upwards (on the basis of a C_6 molecule of cellulose) then the products become soluble in comparatively inexpensive organic solvents.

Solution of the cellulose ethers, when evaporated, leave supple, transparent useable films, and they have been used for the manufacture of plastics, artificial filaments and photographic film. The cellulose ethers are not explosive, but burn with no greater rapidity than paper or other forms of cellulose.

Cellulose Thiourethanes and Xanthimides

Within recent months quite a bevy of new patents have issued to Dr. Lilienfeld, who, as our readers may know, works out his inventions in Vienna, Austria, although many of his patents have been acquired by the Eastman Kodak Co. On their face, however, the recent patents which are about to be described, are not assigned to anyone.

The complexity of the cellulose compounds is rather astounding to the uninitiated, and much difference of opinion is held as to the correct constitution of the cellulose molecule. However that may be, practical results are nevertheless attained and the list of useful cellulose esters is increasing year by year.

The patents cover three groups. The first group comprises 5 patents closely related and issued on the same day, June 19, 1928, being U. S. P. 1,674,401; 1,674,402; 1,674,403; 1,674,404; 1,676,405. They relate to a new type of cellulose compounds, thiourethanes and xanthimides, and although it would be premature to make any predictions as to the future utilization of these products, there can be no question that the disclosures in the patent bear out the often made assertion that we know but very little as yet of the true constitution of the cellulose molecule. When, after 50 years of progress, such entirely new and unpredicted cellulose compounds can be discovered and methods for their preparation patented, it is evident that great progress is in store.

The patents are entirely too long to bear reproduction in our pages, covering as they do from 6 to 8 pages each. The discussion of the chemistry of the compounds however, as explanatory of the scope of the inventions, is however essential for their understanding.

According to the first of these patents, new cellulose derivatives may be obtained by causing compounds derived from ammonia in which an alcohol radical is substituted for at least one hydrogen atom of the ammonia, and in which at least one hydrogen atom of ammonia can be replaced, to react with the products or reaction mixtures obtained by the action of a monohalogen derivative of a fatty acid on a cellulose-xanthic-acid or a cellulose-xanthate (viscose).

Properties

The new cellulose compounds are insoluble or only sparingly soluble in water, but are soluble in alkalies to give solutions which on addition of an agent that neutralizes the alkali (for example an organic or inorganic acid, an acid salt, an ammonium salt, or the like) or of a dehydrating agent (for example a salt, alcohol, or the like), yield precipitates or coagula which may be obtained in transparent, solid, flexible forms such as threads, films, or plates by bringing the solution into a suitable form. The new cellulose derivatives dissolve also, according to the nature of the alcohol radical introduced into the amino-group, and according to the character of the cellulose component, in solutions of alkaline earths, in ammonia, in organic solvents or mixtures of solvents such as bases (for example in many primary, secondary and tertiary amines of the aliphatic and aromatic series, in

poly-amines, in quaternary bases of acyclic, cylic and heterocyclic structure, in bodies of the guanidine and pyridine series, in phenols, in carbon disulphide, in mixtures of carbon disulphide with mono- or polyhalogen hydrocarbon derivatives, in halogen hydrins ofpolyhydroxylic alcohols, and the like). The presence of some water improves the solubility of the new cellulose compounds. Their solutions in suitable volatile solvents, e. g. aqueous pyridine, yield on drying transparent, flexible products (such as films, layers, threads or plates).

In the new cellulose compounds there are obtained for the first time substances of the cellulose group which can be worked up into technical products, by precipitation of their alkaline solutions, as well as by evaporation of their solutions in volatile solvents. These products are superior in many respects to those obtainable from the known cellulose derivatives which are soluble in alkali, for instance, in respect of their firmness in contact with water.

The reactions leading to the formation of the new cellulose compounds may be represented for the simpiest type by the following equations. As an example, are taken sodium cellulose xanthate, sodium chloracetate, and aniline:—

Formation of cellulose-xanthacetic acid:—

SODIUM CELLULOSE XANTHATE
+ Cl. CH_2COONa=
SODIUM CELLULOSE XANTH-ACETATE
(Sodium Cellulose thionthiol-carbon-glycollate)
+ NaCl

Formation of cellulose-xanthanilide:—

SODIUM CELLULOSE XANTH-ACETATE
+ $C_6H_5NH_2$=
CELLULOSE-XANTHANILIDE
(Phenyl thio-urethane of cellulose)
+ $CH_2(SH)COONa$
(Sodium thioglycollate)

The invention is illustrated by the following examples, the parts being by weight:—

1.

(a) (1000 parts of crude viscose (prepared for example by impregnating 100 parts of sulphite-cellulose in fleec- or sheet-form with 1000-2000 parts of caustic soda solution of 18 per cent strength at 15-18° C., allowing the mixture to stand at room temperature for 3-24 hours, pressing until the mass weighs 300-350 parts, comminuting in a shredder or the like, allowing to mature if necessary for 6-72 hours at room temperature, treating for several hours with 50-60 parts of carbon disulphide, and dissolving in sufficient water to bring the total weight of the solution to 1000 parts), corresponding with 100 parts of cellulose as parent material, are diluted, either in the freshly prepared condition, or after standing for a short or long period (6 hours to 3 days), with 5000 parts of water, and then treated, whilst stirring, with dilute acetic acid (e.g. 5-10 per cent strength) until the mixture shows a neutral or faintly alkaline reaction. As soon as the hydrogen sulphide liberated during the neutralization has escaped entirely or for the greater part, the viscose which has become light in colour is treated with a solution of sodium monochloracetate prepared by dissolving 60-100 parts of mono-chloracetic acid in 480-800 parts of water and neutralizing the solution with powdered sodium bicarbonate. When the solution of sodium monochloracetate has been incorporated with the viscose, the mixture is stirred for a short time and then allowed to stand at room temperature. After 6-48 hours standing, there are added to the mixture (which may be neutralized should it react faintly alkaline) whilst stirring, 60-120 parts of aniline. After several hours, the reaction product begins to separate in a finely divided state when the mixture is well stirred, and finally settles to the bottom. As soon as the precipitation is complete, or after the mixture has been allowed to stand after the precipitation for a period of from several hours to three days, the precipitate is separated from the mother-liquor by decanting, filtering, filtering under suction, straining through cloth or centrifuging; by acidifying mother liquor for instance with sulphuric acid, extracting it with ether and distilling the ether, a considerable quantity of thioglycollic acid can be detected (for example by the reaction toward ferric chloride and ammonia or by obtaining it in the pure state). The precipitate which has been separated from the mother liquor is thoroughly washed with water and dried at atmospheric or reduced pressure, if desired, after one or more treatments with alcohol, or with alcohol followed by ether.

Properties and Solubility

The final product is a powdery substance, especially after grinding, insoluble or practically insoluble in water, alcohol, or ether, but soluble in the following solvents, for example: dilute caustic alkali (for instance caustic soda of 1-10 per cent strength), aqueous ammonia (for instance 10-25 per cent), ethylamine, especially in presence of some water, diethylamine, especially in presence of some water, ethylene diamine, guanidine, especially in presence of some water, quaternary bases, aniline, piperidine, especially in presence of some water, pyridin, especially in presence of some water, a-monochlorhydrin, a-dichlordhydrin, especially in presence of some water, ethylene-chlorhydrin, especially when mixed with water, phenol especially in presence of some water, and the like.

The 37 claims of this first patent cover both the process and the product, the latter being broadly designated as cellulose thiourethanes and substituted cellulose thiourethanes. The compounds are described in the claims as cellulose compounds containing nitrogen and sulphur in which a carbon atom is attached to the cellulose group, a sulphur atom and a nitrogen atom by different linkages; and a thiourethane of the cellulose group in which an organic radical is attached to the nitrogen thereof.

(*Continued on page 682*)

Distortion of Plastic Materials Under Heat

Standard testing methods, as described by American Society for Testing Materials according to specification D-48 (27).*

By special permission of the above Society we are bringing to the attention of users of molded material the accepted American standards for determining the physical properties of Plastics.

For earlier articles in this series see October and November PLASTICS.

In order to determine the behavior of molded objects when subjected to heat and simultaneous strains and stresses the following method is employed.

Distortion Under Heat

Apparatus

18. A special apparatus shall be used for this test as shown in Fig. 5. The specimen is supported on steel supports, 4 in. (102 mm.) apart with the load applied on top of the specimen vertically and midway between the supports, the same as for the transverse test, Section 10. The machine shall be arranged to apply a load of 5.5 lb. (2 5 kg.). The specimen shall be placed in an air bath surrounded by an oil bath which is so arranged that its temperature may be raised gradually. The machine shall be so arranged that the deflection of the specimen at its center between the supports can be measured on a scale in mils or millimeters and shall be equipped with a thermometer so that the temperature of the specimen can be recorded at any time. The machine may be arranged to automatically shut off the heat and sound an alarm as soon as the required deflection is reached.

Specimen

19. The same test specimen shall be used for this test as required for the transverse strength test, Section 11, molded to the dimensions of Fig. 3.

Method

20. Three test specimens shall be tested in the condition in which they are received, starting at normal room temperature of about 20° C. (68° F.) and increasing the temperature gradually at a rate not exceeding approximately 1° C. every two minutes.

The distortion point shall be considered the temperature at which the specimen has deflected 10 mils (0.254 mm.) at the center between the supports.

Report

21. The report shall include the following:

(*a*) The breadth and depth of each specimen measured at the center with a micrometer in inches or in millimeters;

(*b*) The distortion point in degrees Centigrade or in degrees Fahrenheit;

(*c*) The length of time in minutes required for each specimen to deflect 10 mils (0.254 mm.);

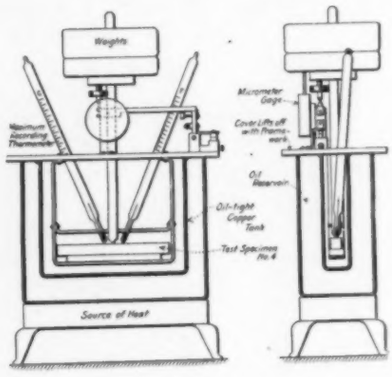


Fig. 5—Standard Machine used for Temperature Distortion Tests

Fig. 5—Machine for Temperature Tests.

(*d*) Any peculiar characteristics of the material as noted either during the test or after the specimen is removed from the machine.

Water Absorption

Apparatus

22. Any good chemical balance, a beaker of water at normal room temperature of about 20° C. (68° F.), and an oven of any standard make capable of maintaining a uniform temperature of 100° C. (212° F.) with a variation allowed of ± 5° C.

Specimen

23. The test specimen No. 3 shown in Fig. 2 shall be used for this test.

Method

24. Three specimens shall be tested. Each of the three shall be weighed separately in the as-received condition. If the material softens readily at moderate temperatures, the specimen may be placed in a desiccator for 24 hours, or in an oven at a temperature of 50° C. (122° F.), permissible variation ± 5° C., for 24 hours. For materials which do not soften readily, the specimen shall be placed in an oven heated to 100° C. (212° F.), permissible variation ± 5° C., for 24 hours. After drying, the pieces shall be cooled in a desiccator and weighed again at normal room temperature. The specimens shall

*Compare the Martens Heat test as used in Europe and described in PLASTICS.

be placed in water, wholly immersed, for 48 hours at normal room temperature. They shall then be removed from the water at the end of 48 hours, all surface water wiped off with a dry cloth, and the specimens weighed immediately.

Report

25. The report shall include the following:

(*a*) The original weight of each specimen;

(*b*) The dry weight of each specimen;

(*c*) The weight of each specimen after immersion for 48 hours;

(*d*) The percentage of water contained in each test specimen as received, and the percentage of moisture absorbed during the 48 hours, taking the dry weight as 100 per cent.

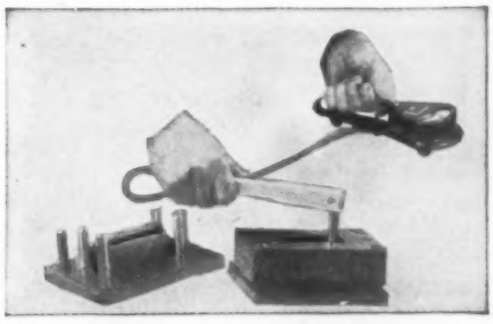
All weights shall be given in grams.

Lynn Fire Caused By Solvent Ignition

The recent unfortunate fire in the Lynn plant of the Preble Box-Toe Co., described in the November issued of Plastics on information derived from the Associated Press, was apparently not directly cuased by the burning of pyroxylin scrap. The letter of one of our New England readers, who is closer to the situation, is reprinted here:

"Furthermore, we would like to call to your attention that there is considerable question as to whether this fire can be properly termed a "pyroxlin plastic fire." We have just read the report of one of the largest insurance organizations in the country who have investigated the fire very thoroughly and attribute its cause entirely to vapor from solvents used in the impregnating process. It is probably true that there was some stock of fi'm scrap present in the building, which undoubtedly contributed to the seriousness stock of film scrap present in the the origin of the fire was the ignition of vapors from the solvents stored in the building."

Mold Surface Temperatures at a glance!



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Cellulose Thiourethanes and Xanthimides

(*Continued from page 679*)

Cellulose Thiourethane Esters

Carrying the inventions and discoveries a step further, we find the second patent (1,674,-402) dealing with the esters of the cellulose thiourethanes made in accordance with the first patent. It would appear from the second patent that the products described therein are particularly suitable for the production of plastic materials, the inventor enumerating a long list of useful products that can be made from these compounds; as, for example, celluloid-like masses; photographic films, artificial silk, artificial leather, etc. Apparently the new compounds possess all the equivalent properties of the already known cellulose esters.

The process, broadly, comprises causing an ester of an inorganic acid to act upon a salt of a thiourethane of the cellulose group, thus producing cellulose thiourethane esters. For example, a N-substituted thiourethane of cellulose is converted into a salt (for example a silver salt by treating an ammoniacal solution of the cellulose thiourethane with ammoniacal solution of the cellulose thiourethane with ammoniacal silver nitrate solution) and thereupon treating this salt with an alkyl, aralkyl, or aryl ester of an inorganic acid. Alternately, alkali salts of the cellulose compound may be used. The inorganic esters comprise such compounds as the halogen esters, phosphoric acid esters, dulfuric acid esters, etc. In all probability, the raction, between the salts of the N-substituted cellulose thiourethanes and the inorganic esters takes place according to the following equations in which, as an example, are taken the sodium salt of a cellulose xanthanilide and ethyl iodide:

$$C_6H_5N{:}C\langle^{SNa}_{O.(C_{12}H_{19}O_9)} + C_2H_5I = NaI + C_6H_5N{=}C\langle^{S.C_2H_5}_{O.(C_{12}H_{19}O_9)}$$

Cellulose xanthanilide — Ethylester of cellulose xanthanilide (Phenylimidothiolcarboxylic acid ester of cellulose).

$$C_6H_5N{:}C\langle^{SNa}_{O.(C_{12}H_{19}O_9)} + (C_2H_5I)n + + (NaOH)n =$$

$$= (NaI)n + + (H_2O)n + C_6H_5N{=}C\langle^{S.C_2H_5}_{O.(C_{12}H_{19-n}O_9.nC_2H_5)}$$

A number of examples are given. For instance:—

Example I.—100 parts of a phenyl- or tolyl-thiourethane, made according to Example 1 or 2 or 6 (in the latter case without neutralizing the viscose or reaction mixture at all) of patent application Ser. No. 727,-805, are dissolved in 4900 parts of a caustic soda solution of 10 per cent strength. The solution, filtered or strained if necessary, is mixed with 600-1000 parts of di-ethyl sulphate and the whole stirred or shaken. After about half an hour or an hour the final product of the reaction is precipitated. It is separated from the mother liquor immediately after there is no further precipitation, or after a longer time (1-8 days) by filtration, centrifuging, decantation or the like, and washed with water until free from alkali. It is then stirred with sulphuric acid of 1-10 per cent strength, again filtered or centrifuged, washed free from sulphuric acid and dried, either at reduced pressure or in the air.

After drying and comminution the product is a more or less fine and sandy or flocculent powder, which is soluble in a mixture of ether-alcohol, acetone (particularly in the presence of small propertions of water), ligroin-alcohol mixtures etc. (listing a great many useful solvents). Plasticizers such as triphenyl phosphate etc. may be used; in fact the products appear to act very much like the older known cellulose esters, except that the new products appear to have a wider range of solvents—which is a distinct advantage.

Plastics from the Products

The third patent (1,674,403) concerns itself with the utilization of the products just described. The preparation of films, artificial fibers such as silk and artificial horsehair, textile dressings, book-cloth, textile printing masses and plastics are described. We shall quote only the last-mentioned.

To prepare plastic masses, Lilienfeld proceeds as follows:

A solution in pyridine of a cellulose-xanthanilide or of a cellulose-xantho-toluidide as referred to in Example 4, mixed with an agent imparting plasticity, for instance camphor, triphenyl-phosphate, an oil or the like, in the presence or absence of dye-stuffs or pigments, is worked into celluloid by kneading the solution at reduced pressure, rolling in a calendar and compressing in a block press, in known manner.

Filaments

The fourth patent (1,674,404) treated specifically of the manufacture of artificial silk and films from solutions of the new cellulose compounds. This is accomplished by coagulating the solutions, much in the same manner as in the manufacture of viscose silk. In fact, viscose is first prepared, and used as the starting point for the preparation of the new compounds, as described in the first patent. A strongly alkaline solution of the cellulose thiourethane is, after filtration, spun through fine nozzles into a bath of sulfuric acid of 50% strength at room temperature or cooler (5 to 8°C), and the threads are washed and dried. No plastics are mentioned in this patent, but the manufacture of film, in exactly the same manner as is used in mak-

ing the threads, except that a film is extruded instead of a thread, is described.

The fifth patent of the group, (1,674,405) deals with a product that may properly be termed a cellulose xanthimide. This may properly be termed a cellulose xanthimide. This may be made from cellulose xanthacetic acid (described in Plastics several months ago ————————) by acting on the same with ammonium hydroxide. The products, thus, are thiourethanes of the cellulose group in which neither of the amido hydrogens is replaced by an organic radical, thus differing from the products described in the first patent. As far as their uses are concerned, the cellulose xanthimides appear to be about the same as the cellulose thiourethanes.

In August, 1928, another group of 3 patents, on still other groups of cellulose compounds appeared. These, and three patents on cellulose ethers, will be described in our January, 1929 issue.

Aviation

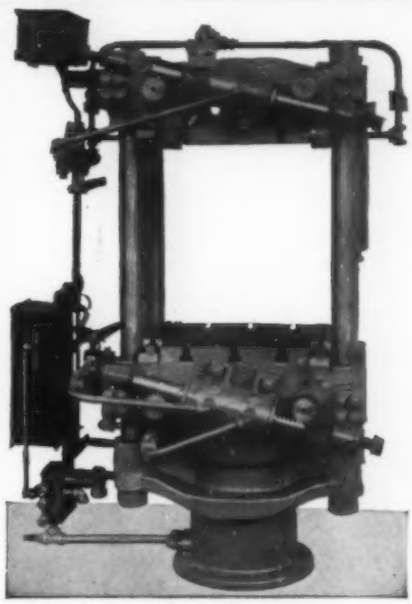
At the recent Airplane Exposition at Chicago (Dec. 3d-8th) there were shown numerous molded instrument parts and engine control devices. The laminated propellers so popular two years ago have however been replaced almost exclusively by metallic ones. Much Triplex non-breakable glass was noticed in the cabin planes.

Mr. John P. Trickey, who was associated for many years with the Miner Laboratories, of Chicago, and whose work on furfural and furfural resins has often been mentioned in our pages, has joined the research staff of the Simmons Co., at Kenosha, Wis.

ARGENTINE CASEIN

The following table shows exports by countries of destinations from August 1 to August 31, 1928, in tons.

United States	913,190
Germany	169,607
Great Britain	55,140
Spain	54,120
Finland	20,040



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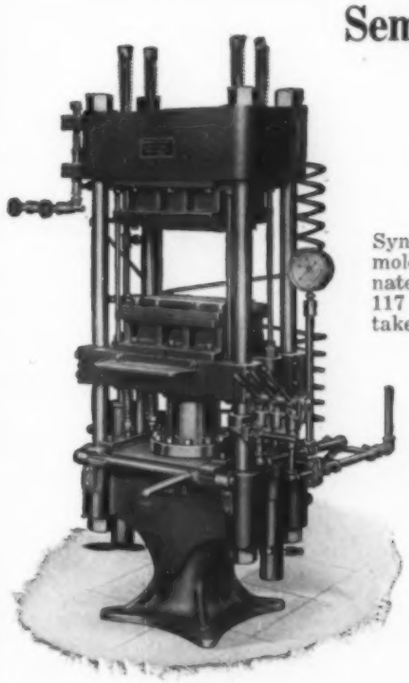

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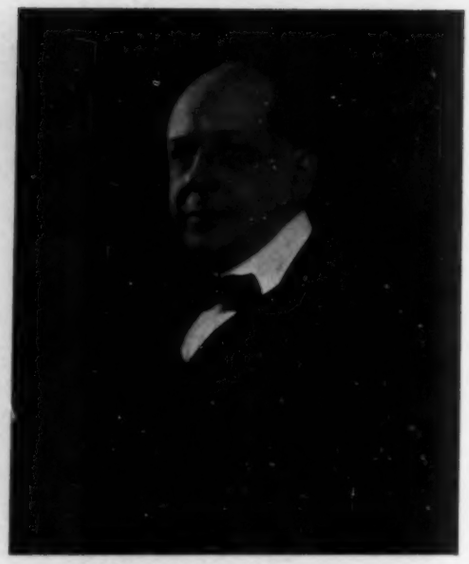
The Celluloid Corp.

(*Continued from page 671*)

Newark, N. J. was selected for this purpose and in December 1872 the company began to fit up a factory in that city. The building was leased from Mr. Coles and was a five-story and basement building about 40 x 100 feet, of rather flimsy construction. The difficulties in solving the many new problems constantly arose, and the resistance of the public to the material caused the company considerable distress and it was barely able to hold its own until 1875. Then came a most severe blow.



Marshall C. Lefferts
Who became head of the Company in 1891

About 6 P. M. on September 8, 1875, a fire broke out which in a few hours left not even the walls of the building standing. The loss was very great, despite 58,000 dollars of insurance. Fortunately the cash asset in excess of liabilities were then at $19,552.01 and the patents were safely valued at $500,000.-.00. Early in the morning after the fire President Lefferts took charge and before that night arrangements had been made for the site of a new plant and contracts let for new machinery. Land, having on it an old four-story furniture factory, at 295 Ferry Street, Newark, N. J. was purchased for $26,000.00. This land formed the nucleus of the present factory of the company, who has been at that site ever since. It comprised what was then 13 city lots. By working night and day additional buildings were erected and by January 1, 1876, less than four months after the fire, Celluloid was again being manufactured, although under difficulties. As of January 1, 1876, the assets of the company stood as follows: Real estate and plant $94,844.86; Materials and Merchandise $6,-082.62.

The fire was really a blessing in disguise as it forced removal of the plant to a place where there was room for development and forced the installation of new and improved machinery. Immediately after the fire the business commenced to earn substantial profits, which increased remarkably during the years that followed.

In 1876, the first year in the new location on Ferry Street, the company earned a profit equal to 16% on their then capital. Consequently, on December 20th, 1876 they paid their first dividend of 4%. During the next 14 years the dividends averaged around 34% per annum, with a high point of 55%. This is a remarkable showing in view of the fact that so much prejudice and sales resistance had to be overcome, especially when active competition came into the field. Three other companies had entered the field: The Arlington Co., the Lithoid Co. and the Zylonite Co. None of these appeared to be able to compete successfully as they were losing money while the Celluloid Mfg. Co. was paying dividends. However, the directors of the Celluloid Mfg. Co. decided to take over the competitors, and the negotiations of 1890 resulted in the formation of the Celluloid Company which was organized on November 24, 1890, with a capital stock of $6,000,000.00.

Shortly after its organizaation, namely on Jan. 1, 1891, the Celluloid Company, as it was now called, commenced business, by taking over the business of the Celluloid Mfg. Co., The Celluloid Novelty Co., The Celluloid Brush Co., American Zylonite Co., The United Zylonite Co. and the Lithoid Co. The consolidation was effected by paying for the plants of the companies absorbed, including any patents, good will etc. in shares on the new Company. Inventories of merchandise and materials were paid for an actual cost at the rate of 75% in shares and remainder in cash. A total of $5,-675,000.00 was paid for the plant and inventories of the various companies, in shares, and $192,597.02 in cash. Besides this additional working capital was secured by selling $325,000.00 of shares for cash at par, leaving $75,000.00 undistributed. The retiring shareholders of the Celluloid Mfg. Co. received 5¼ shares of stock of the new companies and the shareholders of the older companies somewhat less, but all also received good cash dividends.

On the same day, Jan. 1, 1891, Marshall C. Lefferts, son of General Marshall Lefferts, became the active head of the company and was active in all its affairs until his retirement in 1923.

The first effect of the consolidation was somewhat dissapointing as the old companies in anticipation of the combination had oversold the market at all kinds of prices and therefore no dividends were paid until December 1891, when 1½% was distributed. At no time did the dividends of the new Celluloid Company reach those of the old Celluloid Mfg. Co., but they fluctuated from 4% to 19½%, the highest figure (up to 1920) being reached in 1916. During the World War the dividends re-

(*Continued on page 693*)

Molded Mica Products

(*Continued from page 673*)

pile of blanks to an extent which will cause the dovetails between the sectors to meet edge to edge.

53. McCarthy 1,622,796, March 29, 1927.

The method of making composite sheets which consists in showering the constituent flakes from one or more elevated, rotating foraminous drums while progressively moving said drum or drums over said surface until said flakes have been deposited over the desired area of said surface, spreading a binder in liquid form over the flakes and simultaneously rolling said plates and binder upon said surface until a sheet of the desired thickness has been built up.

54. Coffey 1,645,415, October 11, 1927.

An insulating material composed of thin mica splittings bound together by a condensation product of phenol and glycerol having the proportions to produce a highly dielectric and heat resistant resin and reacted together to the stage where the material is still elastic or rubbery.

The following list of patents contain the machines for building composite mica sheets. It is given here in order to make the present article complete as to the U. S. patents on this subject.

Machines for Building Composite Mica Sheets

Gengenbach	494,714	April 4, 1893
Watson	697,696	April 15, 1902
Cooper	718,914	January 20, 1903
Jefferson	764,811	July 12, 1904
Lewis	833,401	October 16, 1906
Elwell	934,057	September 14, 1909
Meirowsky	1,003,368	September 12, 1911
Sills	1,024,529	April 30, 1912
Jefferson	1,026,986	May 21, 1912
Bassler	1,040,995	October 15, 1912
Sanborn	1,074,576	September 30, 1913
Edgecomb	1,126,161	January 26, 1915
Sills	1,133,325	March 30, 1915
Sills	1,196,036	August 29, 1916
Edgecomb	1,201,028	October 10, 1916
Burns	1,234,866	July 31, 1917
Frederick	1,300,370	April 15, 1919
Frederick	1,411,690	April 4, 1922
McCarthy	1,622,795	March 29, 1927
Sprenger	1,631,652	June 7, 1927
Borer	1,633,622	June 28, 1927
Borer	1,644,631	October 4, 1927

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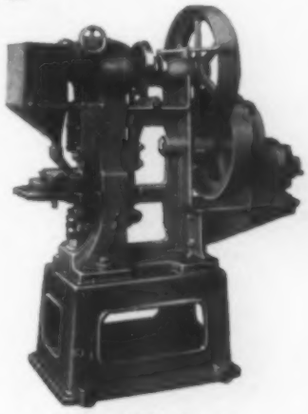

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Improving The Plastic Properties of Shellac

How the addition of small amounts of a guanidine will change the nature of the product so that it may be hardened and molded under pressure like phenol resins

Despite competition from the phenolic resins and the aminoplastics, shellac has certain properties that render it particularly applicable to accurate molding. Its fusibility, which is both an asset and a liability, seems now to have been turned into an asset only, as, according to the present article, shellac can be rendered infusible after molding.

FOR fully fifty years shellac has held its own against artificial and substitute resins for the purpose of making clean-cut molded products. In fact, even at this late date, there is no really perfect substitute for shellac when absolute accuracy of reproduction of the mold is required, as for example in the production of phonograph records.

The excellent finish obtainable with shellac, and the smoothness of flow of shellac molding compositions have made the same a favorite ever since the early days of molded poker chips, dominoes and buttons of the late seventies. There was only one difficulty, and that was the fact that the shellac molded products still remained fusible, that is to say they could again be softened by being heated to a temperature but little above that of boiling water. In some ways, this was an advantage, as it became possible to use up all of the trimmings and scrap.

Hot Molding

The advent of the hardenable resins of the bakelite type, however, brought shellac into active competition with a material that would yield infusible molded products. At first molders could not quite get themselves to believe that an article could be withdrawn from a die while still hot, as in shellac molding the operation always consisted of inserting a mass of plastic shellac composition into the die, applying the pressure and then chilling the die to "set" the molded object, which was then removed cold. The complete cycle of operations in such case varied from a few seconds to a few minutes. With the phenolic resins however there was no necessity of cooling the mold, in most cases, and the hardened objects could be removed from the die still hot. Obviously this saved considerable time.

While the phenolic resinoids were at first fairly expensive the shellac molder could compete without difficulty, but now that the resinoids are quite cheap, new conditions had to be faced. If something could be found that ,at a reasonable price, would enable the production of high-melting or even infusible molded objects from shellac, one of the main problems would be solved. This appears to have been accomplished according to a number of recent patents assigned to the Western Electric Co. These patents cover the preparation of what the inventors term "hardened shellac." The work dates back over four years, as the application dates of the patents (1924) show.

The work is that of Elmer A. Daniels and Harry S. Snell, one of Berwyn and the other of Chicago, Illinois. In their order the patents cover:

The first patent, 1,673,803; June 19, 1928, describes the use of a guanidine (specifically triphenylguanidine) as the shellac-hardening agent. According to this patent:

Using Diphenylguanidine

The best results are obtained by employing diphenylguanidine or triphenylguanidine. Of these two the latter, triphenylguandine, seems to produce the greatest hardening action the exact chemical nature of the reaction occurring, however, being unknown.

Hardened shellac such as that which constitutes one embodiment of the present invention is of very great value in the production of improved molding compounds. An example of molding composition in which hardened shellac is incorporated is, as follows: The shellac is dissolved in a suitable solvent, for example alcohol, the hardener in suitabie amounts added thereto, and the entire mixture incorporated with wood flour, the amount of wood flour used depending upon the properties desired in the finished product. A suitable mixture comprising these ingredients which when completed may be employed as a substitute for wood or other materials may have the following proportions; shellac, 50 pounds; denatured alcohol, 15 gallons, triphenylguanidine, 0.5 pounds; and wood flour 300 pounds. After all of the in-

gredients have been incorporated in the mixture it is agitated until there is a thorough dispersion of all of the ingredients throughout the mass. The mixture is then spread out and thoroughly dried to insure the removal of the last trace of alcohol, after which it is found to be in the form of a dry powder. This powder can then be molded by means of heat and pressure into whatever shape is desired.

Molding

The powder can be molded in a number of ways but good results are obtained by proceeding in the following manner: The powder is placed in a suitable mold and subjected to about 2,000 pounds pressure per square inch for about ten minutes at a temperature of from 260° F to 270° F. The source of heat is then removed and the composition allowed to cool, while still under pressure, to a temperature sufficiently low to allow the pieces to be handled.

An article produced in this manner is resistant to alcohol and remains hard at temperatures considerably above the temperature at which natural shellac begins to soften. The relative amounts of the ingredients may be varied for the purpose of changing the character of the resulting compound, and the temperature, time and pressure of molding may also be varied without impairing the product. Instead of wood flour, other types of fillers may be employed, such as marble dust, asbestos flour, infusorial earth and the like.

Using Aldehyde Ammonia

The second patent, 1,673,804; June 19, 1928, covers a similar process, only that in this case an aldehyde ammonia is employed in place of the diphenyl or triphenyl guanidine. The product is said to be an actual condensation product of the shellac and the aldehyde ammonia, of which latter about 1% only need be used. A further use of this mixture is for waterproofing sand cores for casting metals, as the film left by an

(*Continued on page 690*)

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TECHNICAL ABSTRACTS
AND PATENT REVIEW

Process of Making Soluble Mixed Low and High Fatty Acid Esters of Cellulose. Paul Berthon, assignor to Societe De Stearinerie & Savonnerie De Lyon, of Lyon, France. U. S. P. 1,651,991, Dec. 6, 1927.

A process for manufacturing mixed cellulose esters soluble in hydrocarbons of the aromatic series consisting in heating low organic acid cellulose esters, other than higher fatty acid esters, together with chlorides of the higher fatty acids in the presence of pyridine and benzenic hydrocarbons precipitating the mass at the end of the reaction by alcohol and purifying the product obtained.

Cellulose Ether Compositions. Henry Dreyfus; U. S. P. 1,661,169; March 6, 1928.

A composition of matter comprising a cellulose ether, trichloro tertiary butyl alcohol, other plasticizers, substances for reducing inflammability of the mixture and added solvents.

70 parts of ethyl or benzyl cellulose and about 30 parts of chloretone are kneaded together in the usual way for making celluloid. *Example 2.* 70 parts of ethyl or benzyl cellulose are dissolved in a mixture of about 7 parts of chloretone and about 350-650 parts of acetone to form a solution which may be used as a varnish, or for running to form a film.

Preventing Rancidity of Oils in Pyroxylin Compositions by amines. Walter D. Baldsiefen and Thomas H. Rogers; assignors to E. I. Du Pont de Nemours & Co. U. S. P. 1,675,631; July 3, 1928.

Oils, such as castor oil, when added to pyroxylin compositions to keep them supple soon become rancid. This can be prevented according to the inventors by adding a small amount of diaryl amine or similar compound such as diphenyl-amine, butyl, aniline, meta-nitro-aniline, meta-nitro-para-toluidine etc.

4. A composition of matter comprising nitrocellulose, a vegetable oil, and an aramatic amine.

Urea-formaldehyde condensation products. Use of activated carbon as a Catalyst. Alphonse Gams and Gustave Widmer; assignors to Society of Chemical Industry, Basle, Switzerland. U. S. P. 1,676,543; July 10, 1928.

60 parts of urea are dissolved in 165 parts of commercial formaldehyde of 36 per cent strength and about 5 parts of animal charcoal are aded to the solution. The latter is then boiled for a long time in a reflux apparatus in an air-bath and the charcoal is then filtered. The condensation product obtained is soluble in water and is precipitated therefrom by alcohol (second stage of condensation) . It can be worked up in known manner into solid or gelatinous polymerization products.

Esterifying Hydrated Cellulose with lower fatty acids. Hans T. Clarke and Carl J. Malm; assignors to Eastman Kodak Co. U. S. P. 1,668,945; May 8, 1928.

In the process of making a cellulose ester of a fatty acid, heating together hydrated cellulose and a fatty acid having more than 1 and less than 8 carbon atoms without a catalyst at a temperature between 100° and 170° C. inclusive until substantially 4 molecular proportions of said fatty acid combine with an amount of cellulose corresponding to 24 carbon atoms, said acid being the sole acylating agent.

Re-acetylating Cellulose Acetate. Hans T. Clarke and Carl J. Malm; assignors to Eastman Kodak Co. U. S. P. 1,668,946; May 8, 1928.

The process of partially reacetylating cellulose acetate, the solubility of which has been changed by removal of acetyl groups by hydrolysis, which comprises boiling said cellulose acetate at atmospheric pressure with substantially anhydrous acetic acid with fractional refluxing condensation, to

---

Process of Making Cellulose Acetate. Harry Le B. Gray and Cyril J. Staied; assignors to Eastman Kodak Co. U. S. P. 1,668,959; May 8, 1928.

The process of making cellulose acetate substantially free from haze and graininess which comprises treating cellulose material with an aqueous unesterifying bath containing 35% to 75% by weight of sulfuric acid, stopping the action before the cellulose is degraded, removing the acid from the material until the latter is at least neutral to litmus, and acetylating the material in a bath containing a catalyst weaker than sulfuric acid.

Molded article of sulphur and fillers alone. Harry A. Noyes, assignor to Texas Gulf Sulphur Co. U. S. P. 1,675,376; July 3, 1928.

As a new article of manufacture, a rigid molded structure comprising a compact mass of relatively small particles are held together solely by the bonding action of congealed sulphure. Sand, wood flour or similar filler is molded dry, kept confined in the mold and molten sulphur is then forced in to fill the interstices. Toilet seats, flower boxes, tiling, towel rolls etc. can thus be made cheaply.

Strong Molded Article of Laminated Structure. Frank Kurath and Linwood T. Richardson; assignors to Cutler-Hammer Mfg. Co. U. S. P. 1,674,287; June 19, 1928.

In order to produce a cold-molded article having high impact strength, a plastic mass is prepared of binder, asbestos, sulphur, iron oxide and a solvent. The binder itself consists of stearine pitch, coal-tar pitch, gilsonite and fish or castor oil. The material is formed into thin sheets which are shredded into flakes. When molded the flakes form laminations, thus greatly increasing the impact strength of the material. The claims broadly cover: 5. The method of increasing the impact resistance of molded plastic composition articles, which comprises treating a mixture of fibrous filler material and an organic binder to provide particles of the mixture in flake form, and then molding the flaked material. 9. A molded fibrous plastic composition article, the constituent composite particles of which have a high degree of overlapping relation in a given plane. 10. A molded article comprising composite particles of maximum surface of contact. 11. A fibrous plastic composition material in flake form. 12. A cold molding fibrous plastic composition material in the form of thin flakes. 13. A plastic composition material adapted to be molded under pressure, comprising an organic binder and a fibrous filler mixed and reduced to flake form.

Leather-coated celluloid. Milton H. Cook, assignor to H. N. Cook Belting Co., San Francisco, Cal. U. S. P. 1,677,125; July 17, 1928.

By treating the surface of a sheet of celluloid with the solvent it will be apparent that the surface will become "tacky." Leather dust may then be sprinkled or blown against the surface and then absorb a large amount of the moisture of the solvent which will be rapidly drying, due to the nature of the chemicals used. When the solvent is sufficiently dry to hold the dust the sheets of celluloid which have been thus coated are disposed between pressure plates and held in the desired shape until thoroughly dry. It may be desirable to add a second coat of dust in order to increase the thickness of the product.

This second coat of dust to be applied in substantially the same manner as the first. After the drying action has been completed it will be found that the opposite faces of the celluloid will be a substantially permanent coating of leather and that these surfaces will form a suitable bond with other pieces of leather and cement.

Oil-soluble phenol resin; tung-oil compounds in combination with—. Victor H. Turkington, assignor to Bakelite Corporation. U. S. P. 1,677,417; July 17, 1928.

A mixture of 100 parts of phenol, 150 parts tung oil and 1 part phosphoric acid is heated to boiling under a reflux condenser from one-half hour to six hours. The product will be more or less viscous at room temperature, depending on the time of refluxing and possess a characteristic odor which does not resemble the odor of tung oil. It contains a relatively small amount of the original phenol in free or uncombined condition, removable for instance by vacuum distillation.

To this phenol-oil composition there are now added 100 parts by weight of 40% formaldehyde, 50 parts by weight of colophony and 3 parts by weight of aqueous ammonia and continue boiling under reflux for 5 hours. the reflux condenser is then removed and the water evaporated with efficient stirring. When the water is gone, the product becomes clear. Heating is continued at a temperature of 150° C. until the product is a clear non-tacky and tough solid when a sample is cooled to room temperature. The product is then dissolved in turpentine or toluene 300 parts by weight and when cooled is ready for use. If heating is continued before addition of solvents for a number of hours at 150° C. or above, the product will eventually gelatinize, becoming insoluble in the usual varnish solvents.

Sulphur Plastics. Carleton Ellis, Montclair, N. J. U. S. P. 1,676,604; July 10, 1928.

The brittleness of sulphur when used as a binder for plastics is overcome by the addition of sulphur resins such as those produced when phenol is treated with sulphur chloride. The amout of resin added varies from 25 parts sulphur to 100 parts to 400 parts sulphur to 100 parts resin. Claim 18. A composition of matter comprising sulphur and an organic material which is readily soluble in molten sulphur in such amounts as to at least very substantially delay the crystallization of sulphur in passing from the molten state to the cold state, and to thereby yield upon molding, articles which for a considerable time will have substantially greater tensile strength and toughness than modeled pure sulphur articles of similar size and shape.

New Softeners for Cellulose esters:—beta-phenoxy-ethyl phthalate, beta-methyl-phenoxy-ethyl phthalate, and beta - methyl - phenoxy - ethyl laurate. Richard C. Kramer, assignor to E. I. Du Pont de Nemours & Co., Wilmington, Del. U. S. P. 1,676,612; July 10, 1928.

The above compositions, broadly designated as "carboxylic esters of an aryloxy ethanol" are used with pyroxylin as plasticzers and softeners.

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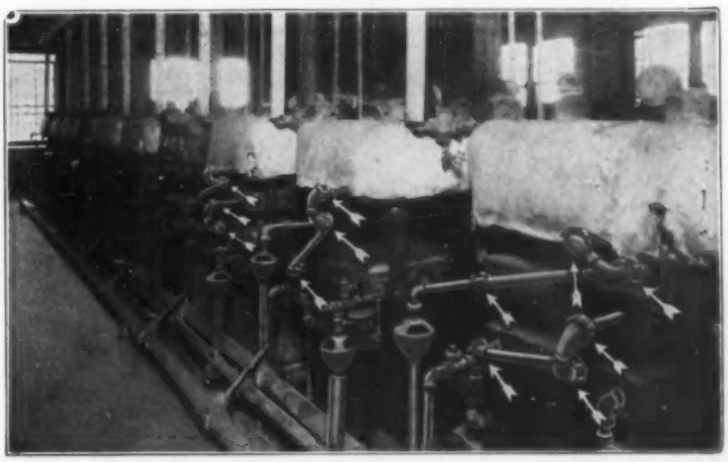

Proper molding is a vital factor in the manufacture of products from plastic compounds. Behind reliable press performance must stand dependable steam line piping. FLEXO JOINTS will not clog, break, burst or leak and insure a full flow of new steam at all times irrespective of the movement of the platens.

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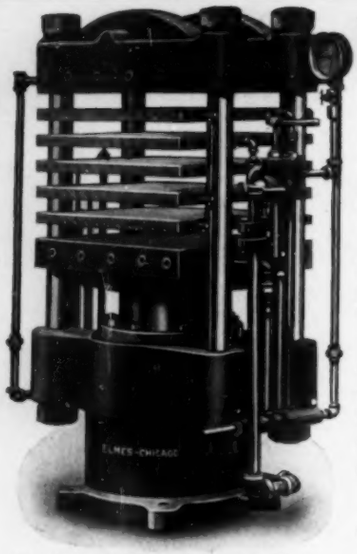

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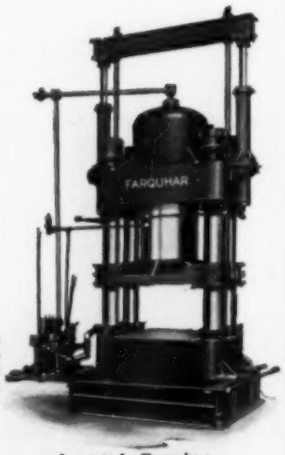

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Plastic Properties or Shellac

(*Continued from page 687*)

alcohol solution of a mixture of shellac and an aldehyde ammonia forms a high-melting condensation product. In preparing a suitable molding composition the shellac is dissolved in a suitable solvent, for example alcohol, the hardener in suitable amounts added thereto, and the entire mixture incorporated with wood flour, the amount of wood flour used depending upon the properties desired in the finished product. A suitable mixture comprising these ingredients which when completed can be employed as a substitute for wood or other materials, may have the following proportions: Shellac, 50 pounds; denatured alcohol, 15 gallons; aldehyde ammonia, 0.5 pounds; and wood flour, 300 pounds. After all the ingredients have been incorporated in the mixture it is agitated until thorough dispersion takes place, is then spread out and thoroughly dried to remove the last trace of alcohol. The residue, after the evaporation of the alcohol, is a dry powder which can be molded by heat and pressure into whatever article is desired. The molding operation may be carried on in various ways, but good results are obtained by employing a pressure of 2000 pounds per square inch for about ten minutes at a temperature of about 250° F. After heating, the composition is allowed to cool in the mold until the articles can be conveniently handled.

By Use of Naphthylamine

The third patent U. S. P. 1,673,805; June 19, 1928, describes the use of an aromatic amine, specifically naphthylamine, but claimed broadly as a composition of matter formed by the condensation of a resinous exudation and an aminonapthalene, thus covering all of the amino derivatives of napthalene. The example, however, recites the use of alpha-naphthylamine. For example one may use shellac 50 lbs., denatured alcohol 15 gallons, alpha-naphthylamine 0.5 lbs. and wood

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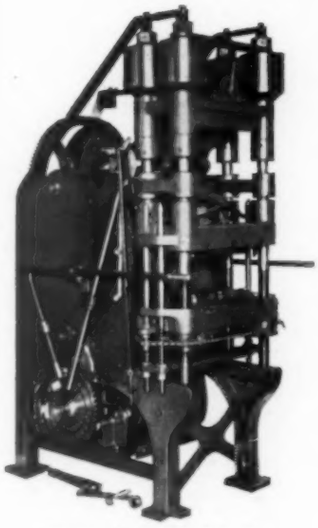

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flour 300 lbs. After all these ingredients have been very thoroughly mixed to attain a complete dispersion of the ingredients, the mass is spread out thinly in order to allow the alcohol to evaporate. The composition when finished consists of a dry powder directly suitable for molding at 200 lbs. pressure and from 260° to 270° F.

Cork may be used as the filler instead of wood flour, so that an extremely light product results. This product as well as the preceding products are resistant to alcohol, thus differing from the ordinary sheilac compositions which dissolve in or are softened by alcohol.

Carrying the idea one step further, we find that in the fourth patent, 1,673,806; June 19, 1928, another amino compound, this time diphenylamine, is used to bring about the hardening. The technique is quite the same as that already described in connection with the other compositions mentioned above.

Evidently spurred on by the success obtained with the better known amino compounds, the inventors spread out further, and investigated some addition products derived from piperidine and carbon disulfide. One that was found to be particularly suitable was the piperidine salt of p e n t a methylenedithiocarbamic acid

$$(C_5H_{10}N—\underset{\underset{S}{\|}}{C}—SH,C_5H_{11}N).$$

The composition is made up in a manner analogous to that already described, alcohol being used to bring the shellac and hardener together. The patent covering the piperidine-carbon disulfide condensation products as hardeners in 1,673,807; June 19, 1928.

The final patent, at least as far as they have issued, covers the use of a sodium salt of beta-napthol, which is used exactly as the other compounds already mentioned. The patent on this feature is 1,673,808.

The molding of objects with this material is described in U. S. P. 1,673,803.

Essential Books

Plastics and Molded Electrical Insulation.

Emile Hemming. 313 pages. Illustrated. $6.00.

Very special care has been taken in the preparation of the chapter on molded insulation. Contains hundreds of references to plastic and composition products and their utilization in industry.

* *

Casein and Its Industrial Applications.

Edwin Sutermeister. 296 pp. Price $5.00. Illustrated. 1927.

Eleven authorities, many of them specialists in this field, have contributed to this volume. "Casein Plastics" is from the pen of Dr. Geo. H. Brother.

* *

The Chemistry of the Natural and Synthetic Resins.

T. Hedley Barry, Alan A. Drummond and R. S. Morrell. 196 pp. Price $5.50. 1926.

The work of three English chemists, who are recognized authorities on this subject, one of vital interest to the Plastics Industries.

Celluloid.

Its raw material, manufacture, properties and uses.
Dr. Fr. Bockmann. 188 pages. 69 illustrations. $3.50.

In this book, the raw product, cellulose and its properties are thoroughly described. Other raw materials and methods of rendering them more plastic also receive attention.

* *

Synthetic Resins and their Plastics.

Carleton Ellis. 514 pages, illustrated. $8.00.

The book will serve as a guide and prove a stimulus to the numerous investigators and practicioners in the field of artificial resins. The section on plastic molding is an especially valuable feature.

* *

Pyroxylin Enamels and Lacquers.

Samuel P. Wilson. 213 pages. Illustrated. $3.50.

An authoritative work dealing with the materials and manufacture of pyroxylin solutions and with their application in the industry.

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BOOK REVIEWS

1928 Chemical Engineering Catalog. 13th Annual Edition. The Chemical Catalog Co., Inc., New York City. 1107 pp.

THIS standard compilation of Chemical engineering equipment is again brought to the attention of technical men in a completely revised form. Chemical engineers, works managers, purchasing agents and operating engineers look to this volume for information concerning equipment and materials for every branch of chemical industry, in which the field of plastics is certainly included.

The new edition, which is published under the supervision of a joint catalog committee of the American Institute of Chemical Society and American Section, Society of Chemical Industry, shows the results of a decided effort to increase the reference value of the volume. Previous volumes contained only a single index, which entailed much turning of pages until the required information was found. This present edition has three separate indices, namely equipment and supplies, chemicals and raw materials, and trade names, which division is certainly a time-saving device. The index of technical books has been revised and brought up to date, many new books published during the past year having been included.

As to its bearing on the plastic industry, the catalog offers a fairly complete survey of the field of equipment; giving illustrations and descriptions of almost every device on the market that may be required in the production of molded articles. In the matter of materials, however, the listing is far from complete. This may be explained by the fact that the catalog is meant for the chemical industry in a broad sense; so highly specialized an industrial group as the plastics field being apparently beyond its scope.

A Survey of Nitrocellulose Lacquer by Bruce K. Brown and Francis M. Crawford. Chemical Catalog Co., New York City. 368 pp. $7.50.

It is fully ten years since the birth of the modern nitrocellulose lacquer industry, the industry which has risen to the class of those which can afford two page colored advertisements in the great national weeklies, yet can boast of hardly half a dozen recognized books dealing with this field of chemical technology. The present volume is a not inconsiderable addition to nitrocellulose lacquer literature and is noteworthy in its contents and its treatment of the subject it encompasses.

Its title indicates that it is not a handbook for the lacquer formulator but rather a more encyclopedic work of a reference nature in which the development of lacquers is traced by means of a patent survey and a bibliography of the tremendous periodical literature on the subject of lacquers that has been printed in recent years. An introductory chapter in which fundamental properties of lacquers are touched upon, is followed by the patent abstracts classified according to the countries granting them and arranged in order of date issued. The authors go back to those years in which only the "high viscosity" solutions were known, but a review of this period throws much light on the matter of solvents and plasticizers, which are still matters of controversy at this time. Worden's work is classic in this respect but hardly up to date. The present text supplements this by bringing forth a classification complete to 1928.

The authors did themselves and their work an injustice in their choice of title. At least half the contents of the book deals with matters other than nitrocellulose lacquers. The allied fields of other soluble cellu-

(Continued on page 694)

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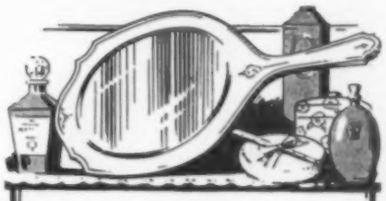

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Pneumatic air compressor with accumulator.

Two hydraulic presses, 16 platens with one opening about 3 inches.

Must be in first class condition. State prices and where can be seen.

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The Celluloid Corp.

(*Continued from page 684*)

mained constant at 10%. During the entire existence of the Celluloid organization (i.e. the period from 1877 to 1920) a total of $15,647,445.00 was distributed in dividends, or an average of $363,000.00 per year for the 43 year period.

During its history the Celluloid organization had some strenuous litigation, the two outstanding cases being the suit by Daniel Spill filed in 1876, and that of the Goodyear Dental Vulcanite Co. vs. Davis and 68 other defendants, whom the Company defended. The final outcome of both suits was a victory for the Celluloid Mfg. Co., although Spill had won at first and a Master in Chancery had awarded him damages to the amount of $539,031.50. On a rehearing, however, really precipitated by a second suit to restrain what was alleged to be a new infringement, the Company was able to prove to the satisfaction of the Court that Spill did not

invent the use of alcohol and camphor but that Alexander Parkes had done so, and as a result of this finding reversed the case. A complete history of this case was given in 1926 Plastics, p. 86, (for further details see 22 Blatchford C. C. R. p. 441). Another suit was over the infringement of the trademark rights by the word "Cellonite" used by a competitor, the Cellonite Mfg. Co. The Celluloid Mfg. Co. also won this case, the court deciding the names sounded deceivingly alike (see Official Gazette, U. S. Patent Office, 1887, Vol. 41, p. 693).

The recent history of the Company is probably known quite well to all of our readers. In 1926 the Celluloid Company found itself in a financial depression and an reorganization was effected, whereby Robert Campbell became president.

After the reorganization was completed, Mr. Campbell devoted his energies towards securing wider fields for the company and towards improving its financial condition. There had been called to his attention the research and development work done in the making of non-inflammable celluloid from cellulose acetate as a base. Sales, however, had been limited because the cost of the base was too high. Through Mr. Campbell's efforts an affiliation was made with the Celanese Corporation of America whereby the Celanese Corporation purchased a 51% control in the new corporation organized at that time, and the new corporation has addressed itself actively towards developing the new product sold under the trade name of "PROTECTOID." Through point of time, therefore, the new organization which bears the trade name "CELLULOID" is the oldest in the plastic industry.

It is an interesting circumstance that neither of the Hyatts remained very long with the company that they had organized. I. Smith Hyatt retired during the early days of the Celluloid Mfg. Co. and went to Europe to develop the industry there, while John W. Hyatt, the inventor of Celluloid, retired somewhat later to devote himself to his other inventions. It may be known to our readers that Mr. Hyatt is also the inventor of the well-known roller bearings that bear his name. In addition to these he made inventions in the field of water purification and extraction of sugar from sugar cane.

Products Made of Celluloid in Early Days

The great demand for something to replace the expensive and somewhat unsatisfactory vulcanized rubber dental plates gave the first impetus to the manufacture of Celluloid. During the first years of the Mfg. Co. this was the largest item sold. Later on the outlet for the material, although at the present time the popularity of this type of "permanent" wear is not so great. Toys and brushes also were large consumers of the material, and since 1890 the uses have increased by the thousand. Like the newer plastic materials Celluloid had to do a great deal of pioneering in order to teach the world how to use its material, and the detailed description of how to mold a dental plate in a steam or glycerine heated mold make interesting reading.

The Celluloid Company, after its organization in 1891 felt the need of a New York office, and the first one was at Broadway and Howard St., New York City, but after 1896 a large and commodious building was erected at Washington Square, at the corner of Washington Place. In a historical booklet descriptive of the City of Newark (published about 1898,) there appears a condensed history of the Celluloid Co., with views of its New York office and showroom, and containing what now reads rather amusingly in regard to the "uptown" office of the company in New York. For instance:

"It was with considerable hesitation that the company determined, after having been so many years located in the lower part of the city, to move, as it seemed at first, so far uptown. But, after careful consideration of the subject, the directors became satisfied that the trend of business was so decidedly to the *upper* part of Broadway *below* 14th Street, and that the convenience of their customers would be greatly consulted thereby, and the move was finally decided upon.

When one considers that this was just a little over 30 years ago, and compares it with the enormous growth of New York and the great progress made in the Plastic Industries since that time, it will become evident that the future of this industry, in which Celluloid and similar plastics will always continue to play an important part, is of unlimited scope.

Book Review

(*Continued from page 692*)

lose esters and ethers, notably cellulose acetate and ethyl cellulose, are as completely covered as nitrocellulose. Aside from lacquers and other similar solutions considerable space is devoted to cellulose ester and ether plastics, which department should prove of great interest to workers in this field.

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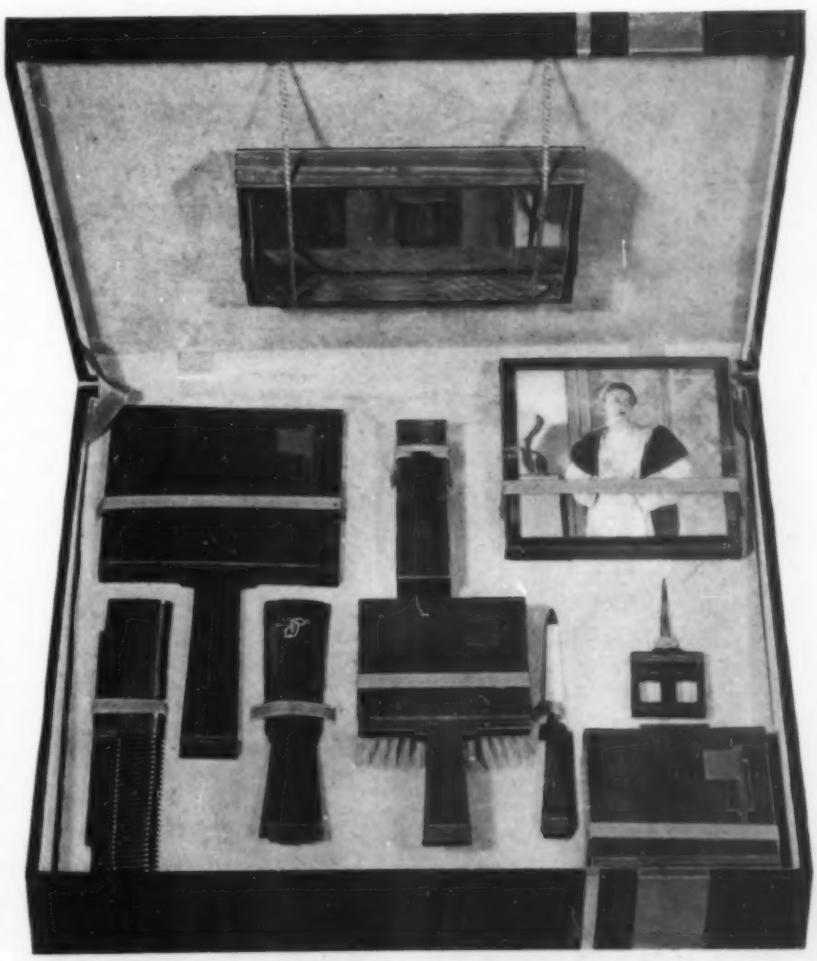
Vol. 2 DECEMBER, 1928 No. 12

Modern Art In Pyroxlyn Products

New Celluloid Toilet Sets Designed By Paul Th. Frankl

THE so-called modernistic art has become a definite trend in interior decoration in America. Furniture, fabrics, wall papers and ceramics in geometric conceptions have passed outside the realm of the connoisseur and have been offered to and accepted by the masses. And now there is introduced an article outside the strictly decorative class, a modernistic toilet set, of unquestioned utilitarian value, which complete the balance in a dressing room or boudoir decorated in the modern style.

The Celluloid Corporation, in engaging the internationally known designer Paul Th. Frankl, introduced the modern note in the pyroxylin field. Mr. Frankl is considered a leader of the modern school of decorative art in America. His two toilet set creations, the Rond, in a circle motif and the Carree, a rectangular design, are restrained but distinguished. The sets, in either three or ten piece groups, are offered in several color combinations. The ivory and jade are decorated with black or sil-



ver while the jet is set off with silver or gold. The stock is the well-known Amer-Glo. The jet and silver combination simulate a metal finish but the articles have the light weight of celluloid. Two other modernistic designs supplement the Frankl creations.

These toilet sets are wholly of pyroxylin plastic material without any metal parts whatsoever as are included in some sets on the market. They constitute another example of the multitudinous fields that plastic materials enter into and the variety of treatment they are capable of towards producing beautiful and useful objects.

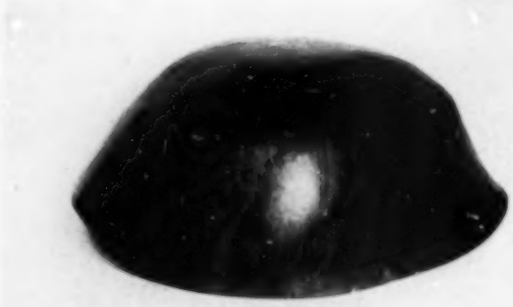
Molding at the Service of Surgery

MODERN science may be credited with having worked a miracle in restoring to life a man pronounced dead from the shock of an electric current several hundred times as powerful as that used in the death chair.

Two years ago Norman D. Ellis, of Toronto, was rendered lifeless by accidentally touching his head to the live bus wire furnishing the energy from a 5,000 horsepower hydroelectric station.

Resuscitation applied by fellow workers who refused to accept a doctor's decision that the man was dead brought the first gasp of breath after 45 minutes working over his body.

But he had been terribly burned from the high voltage current and his entire skull appeared to have been destroyed. Dr. R. E. Gaby and Dr. K. G. McKenzie, surgeons of the Toronto General Hospital, conducted a series of bone operations, the last of which was completed less than a month ago.



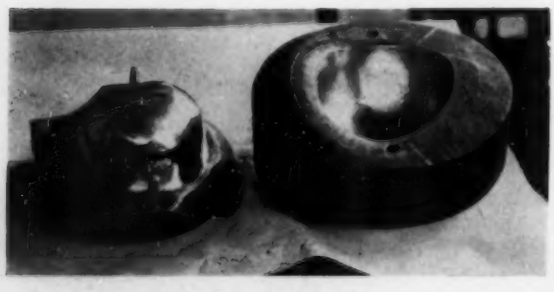
N. D. Ellis, of Toronto wearing his Bakelite "skull piece."

The final problem was to find some material which could be fashioned into a shape to replace the top of Ellis' head which had to be removed. It had to be something light and durable. And it was essential that the material be more or less inert.

Modern chemistry had developed such a material through the combination of phenol and formaldehyde, from the invention of Dr. L. H. Baekeland. It this material which was selected, but only after a remarkable task had been performed in reproducing from a mold the exact duplicate of Ellis' skull. Today he wears this Bakelite skull piece.

Ellis says that his "cap" is very satisfactory. "I never had a hat that fitted me quite so well," he states. But no man had more trouble being fitted to a hat than Ellis.

As soon as the healing had progressed far enough, his head was covered with surgical gauze and a plaster cast was made of the back portion of the head. This was covered with a film of dental wax and another cast was made so that when the two were separated and the wax removed, a cavity was revealed conforming to the shape of his head. This was done to give ample space so that the cap would not press down on his brain.



Mold of fine grain cast iron.

A mold of fine grain cast iron was made, and then copper and nickel plated, in which the Bakelite skull was formed by the usual molding process.

Ellis wears his cap under a wig which, to some extent, serves to hold it in place, but it is mainly secured by means of a small strap which goes around his forehead and is attached to the cap with a small piece of adhesive tape.

How You Can Use Modern Plastics

By Carl Marx

SUCCESS in the present day era of efficiency is predicated primarily on two things; the ability to produce a better article at a lower price, and, to make the article so attractive that it can be sold in very large quantities. The net result, if both of these factors are present, is virtually to assure dominance in the particular field in which the efforts are directed. One of the most striking examples of this doctrine is the unique position held by Henry Ford in the automotive industry, where, by a combination of a better article at a lower price, coupled with desirability, he succeeded in selling fifteen million Model T Fords before his competitors, after 18 years of active effort, finally came within hailing distance of him and made it necessary, for the first time in his career, to make a radical change in the design of his car.

Similar examples, though perhaps less striking and obvious, are occurring around us every day. No alert manufacturer can keep his mind shut against the progress being made all around him. No longer is the saying "what was good enough for Washington is good enough for me" true of modern merchandise and selling methods. In this day of transoceanic aviation, television, and radio-politics changes take place so rapidly that an article that was perfectly merchantable last week, is out of date today.

The molding of plastic materials, also, has played an excedingly important part in this progress; and it is of this part that forms the burden of our lay. If you are a manufacturer of almost any article except structural steel and railway tracks, you will find that the art of molding and shaping the modern plastic materials holds out many excellent opportunities for cutting costs, improving the qualities of your product, and enhancing its sales appeal.

As this is perhaps not self-evident, and as also you may not know very much about the plastic materials, let us tell you just a few things about them, as a sort of introduction. We know that those who are familiar with the materials will pardon us for a little repetition.

A hundred years ago, plastics, as we know them today were virtually unknown. The only material that could be said to share some of the properties with the substances we use today was papier mache, a sort of moist paper pulp that was employed to make art objects, trays and the like. For mass production, however, this material, which required great skill in its manipulation and much time in its fabrication, was entirely unsuited. Pottery and china-ware have been with us since the dawn of civilization, but as these articles invariably require firing at high temperatures, and can not, even with all the skill and technique available today, be made absolutely alike and uniform, they fail to meet the demands of mass production, and speed in manufacture.

The First Real Plastic

Just short of fifty years ago the world was presented with its first artificial plastic that could properly call itself such. It was a material named "Celluloid" by its inventor, John Wesley Hyatt. Under this name it has become known throughout the world, so that today the common name for any plastic made from cellulose nitrate, or pyroxylin as it is sometimes called, is celluloid.

Now celluloid is nothing more nor less than a converted form of cellulose. Cellulose is the scientific name for the substance that constitutes such common material as cotton (one of the purest forms of cellulose known) paper, linen, and the main constituent of wood. When cellulose, in the form of paper, cotton or cotton waste, is treated with a

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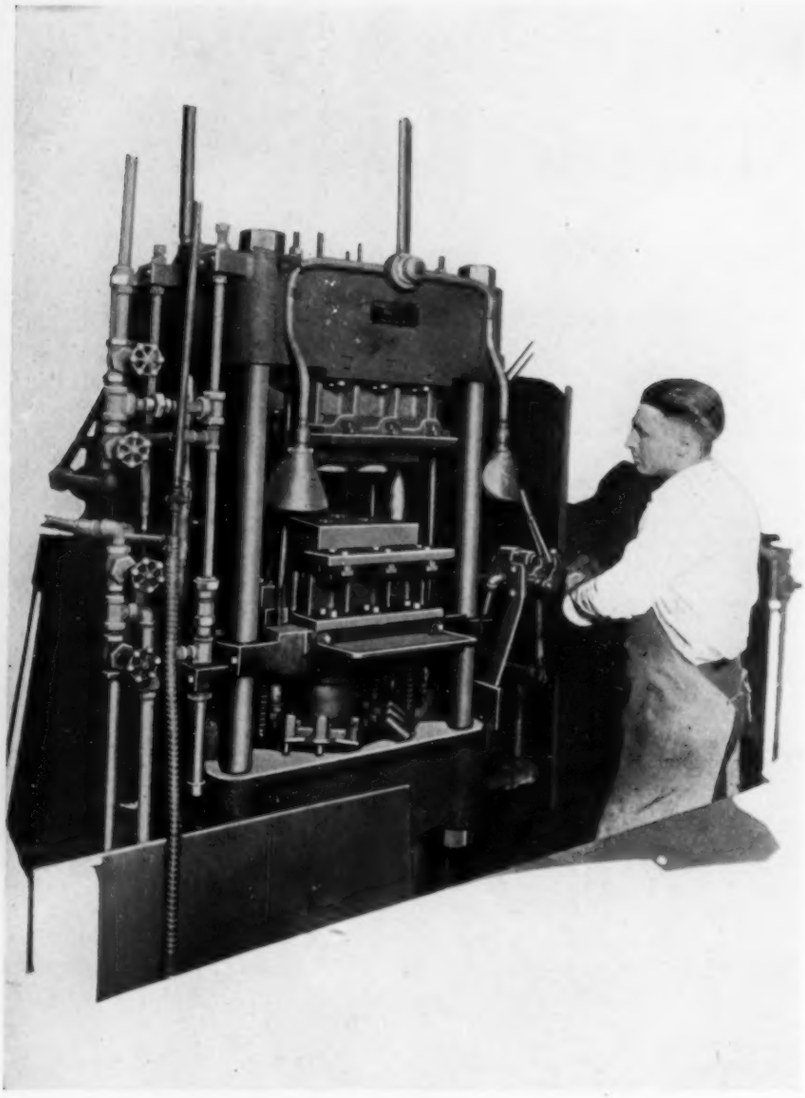
Plastics and Molded Products circulates among distinct types of readers—one a group of technicians and chemists who know all about the chemistry of the materials involved and who are anxious to keep informed of all the scientific progress made in their chosen field of endeavor; and a group of practical molders and fabricators of the materials, who know all the tecnique of making dies and molds and of designing and molding the finished objects.

There is, however, a third, and very large group, which comprises the users, and potential users, of the molded products themselves. This also includes the sellers and dealers. These readers, while intensely interested in the utilization and application of these materials, have but a vetry hazy and incomplete knowledge of what they really are made of. As a result, they often try out some one material that is unsuitable for their particular use, and, being disappointed, drop all further efforts to use molded products, returning to wood, metal or similar substance.

It is for the benefit of this large, and growing, class of readers that the series of articles beginning with the present one is intended. It is our main purpose to acquaint them with what the plastic materials ARE, what they will DO, and How they can USE them.

Molders and fabricators are cordially invited to contribute suggestions and ideas for furthering the uptilization of the plastic molded materials, for in this way they will best serve themselves and the industry as well.



One type of press used in molding phenol resinoid materials.
—By courtesy of Bakelite Corp.

mixture of nitric and sulfuric acids, a part of the nitric acid attaches itself to the cellulose and forms what the chemist calls Cellulose Nitrate or nitrocellulose (the former term is the more accurate), and what the artisan and celluloid manufacturer calls either pyroxylin or nitrocotton. By itself, cellulose nitrate is a white substance that differs but little in appearance from the untreated cellulose, but it is endowed with some very interesting, and also dangerous properties.

If sufficient nitric acid has combined with the cellulose to form trinitrocellulose, it forms guncotton, and, as such is used for charging torpedoes and mines, or is converted into smokeless powder. It requires no imagination to see that this material is of the greatest possible importance for warfare—in fact it is the one **sine qua non** without which war as we have come to know (and hate) it would be impossible.

You can readily appreciate, therefore, that to produce so useful a plastic as celluloid from this potentially dangerous raw material required inventive ability. and courage, of a high degree. Hyatt, however, possessed these qualities. By combining camphor with the cellulose nitrate he was able not only to take away the explosiveness of the cellulose nitrate, but at the same time endowed it with entirely new and unexpected properties.

Cellulose nitrate, therefore, when combined with camphor, and with suitable coloring matter, forms the basis of celluloid or broadly speaking, of the pyroxylin plastics. Modern chemical engineering and inventions have so limited the combustibility of celluloid that it can now safely be shaped and molded in electrically heated dies, and much of the difficulty in molding that formerly handicapped the applications of celluloid have been removed.

Cellulose Acetate

Another very similar material, and which the layman can hardly distinguish from it, is cellulose acetate. This differs from cellulose nitrate in that it is acetic acid (the acid in common vinegar) that is combined with the cellulose instead of the nitric acid. In many ways cellulose acetate plastics can take the place of the pyroxylin or cellulose nitrate plastics, but they are not as yet as inexpensive, although their use is rapidly increasing.

Both cellulose nitrate as well as cellulose acetate plastics require the material to first be made into some form of raw material, either rods, tubes or sheets and blocks. From these shapes, the final articles are molded, drawn or spun. For instance, doll heads are made out of thin sheets of celluloid by blowing steam between them while the sheets are clamped in a press in a mold that is shaped as the finished heads are intended to be. The hot steam softens the celluloid and its pressure forces the celluloid into contact with the mold. Cold water is then introduced, either into the interior of the head, or into the walls of the mold, and the celluloid, again becoming hard, sets into the desired shape. Similar methods are used in making other hollow celluloid objects. Solid objects are shaped in hot molds from the sheets, properly blanked out by cutting. Thus umbrella handles, toilet sets, mirror backs and the like are made. In all cases, the material first requires blanking

out before molding. Very recently powdered celluloid-like material, that can be molded directly into objects, has been introduced. More of this, however, later on.

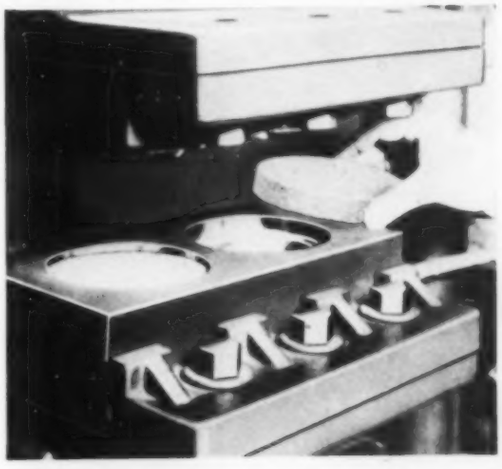
Shellac Type of Molded Products

An entirely different form of material from which objects can be molded is found in the many fusible resins, such as rosin, copal resin, and especially in shellac. The layman usually associates shellac with the varnish-like solution that is used for covering knot-holes in boards before painting, or in gumming the gaskets when putting an automobile engine together. However, it is the dry shellac, undissolved in alcohol, that is used in plastics. Shellac, let us add, is a very peculiar substance. It has not as yet been prepared artificially, and the world depends upon its supply for the activities of a bug that thrives on certain types of shrubs in far away India. The bugs exude the shellac from their bodies, finally become encased in it, and die. The masses of hardened shellac resin is gathered, melted and filtered to remove the dead bugs, pieces of bark and other debris. As shellac melts rather slowly, it is particularly suitable for shaping under heat, as it becomes soft before it becomes liquid. This particular property is an absolute essential for **every** molding composition, and all research in the production of new and useful molding materials is directed toward a substance that will flow freely under heat, but will yet retain enough body to adapt itself with utmost fidelity to the mold or die that is used to shape it.

At right: Finished ash-tray removed from mold.

Below: Preformed cake of molding material placed in die to be subjected to heat and pressure.

Photos by Courtesy of Bakelite Corp.



In commercial practice, shellac is mixed with powdered rock (rotten stone, brick-dust, powdered chalk, barytes, lampblack, etc.), the finished material usually containing about 22% of shellac. Thus far nothing has been found to replace shellac in phonograph record manufacture, if real fidelity of reproduction is desired, and this industry is one of the largest consumers of shellac. When properly and carefully made, molded shellac articles have a finish and appearance that leaves nothing to be desired, and millions of molded shellac articles are made every week. Where resistance to heat is not required, shellac forms perhaps the best heat-plastic (i. e. thermo-plastic as the technicians would say) known today. So accurately does it reproduce the mold that the faint reverberation from the walls produced when an orchestra is playing in a large hall can be reproduced in a phonograph record and will be audible when the record is played on a good orthophonic or electric type of phonograph. In other words one can tell by listening that the orchestra was in a hall, and not outdoors. This means an accuracy of less than a 1/100,000 of an inch!

Modern Phenol Resins

Early in the present century the first efforts to produce a different type of resin, at first in imitation of shellac, were made. Real success did not come however until Dr. Leo Baekeland invented a resin made from carbolic acid and formaldehyde (two strong antiseptic substances), which was called **Bakelite** in honor of the inventor. Now it seems very strange to the lay mind that two such entirely unrelated substances as carbolic acid (called phenol by the chemists) and formaldehyde (sometimes known as Formalin, which is its solution in water, the substance itself being a gas) should be capable of combining into a glass-like material that will either soften under heat like shellac or which can be made so that it will neither

(*Please turn to page 713*)

Molding the Christmas Gift

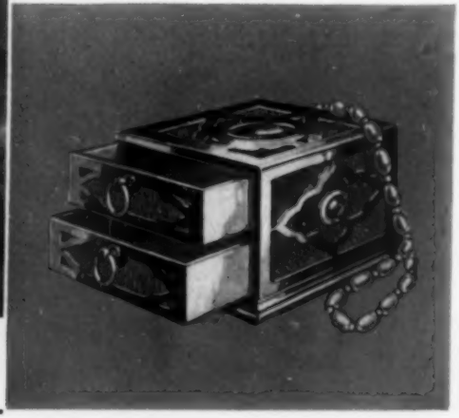
Some examples of the delicacy and beauty molded articles can achieve

Desk sets are capable of remarkable effects in molding. Here is an attractive creation in Bakelite.

Beauty and refinement in molding technique and color pigment effects are prominent in the latest achievements in Bakelite novelties, as instanced in this smoker's set.

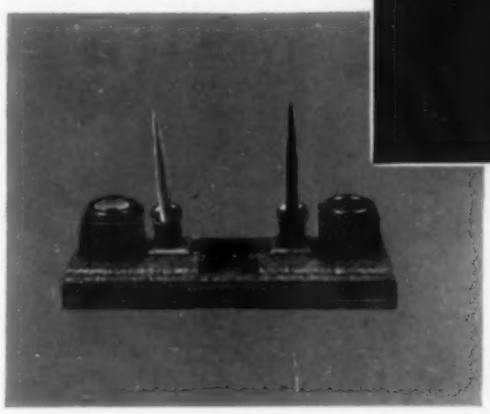
This example of artistic molding in Durez combines a compact and lipstick.

Here is a graceful variation on the cigar-lighter motive. It is made of Bakelite and designed to be placed on table.



A charmingly designed jewel box in Durez.

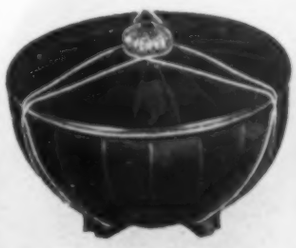
A Bakelite pipe qualified to grace any smoker's collection.

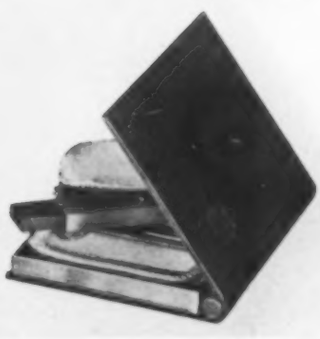


To use the pens in this attractive set no more than one dip a day is required. The set is molded of Durez.

Utility and art are combined in this striking set of Bakelite poker chips and container showing handsome carving effects.

In this graceful powder box and compact made of Durez the art of molding furnishes beautiful and durable additions to the feminine toilet.





"The Courtship of Lady Nicotine" is the title of this ingeniously contrived book which contains all the essentials of the cigarette smoker. It is made of Durez by the Colt Patent Firearms Co.

Gain—Or Loss?

Analyzing the reports on the Molding Industry, and reporting 1928 conditions, brought this interesting criticism and survey

By R. C. Gilmore, Jr.

MANY are the reports that are circulating in regard to the status of the molding industry during the past year. The majority of them are unfounded, given because of some vague superstition that, unless the industry is shown in a profitable position, the year 1929 will be even less lucrative. The few rumors that do have some foundation have been based, for the most part, on indiscreet and unethical saleman's disclosures and random guesses at what the total business would be if it were uniform in different sections of the country.

The following article founds its claim to reason on the fact that every specific set of figures, every formal judgment and bit of information, has been checked and vouched for by the writer and at least two authorities.

When our readers consider that the Bureau of the Census conducts no industrial survey on this field and that many concerns are influenced by the rumors mentioned in the preceding paragraph, they will realiize that this survey, although far from complete, is as exact as is within our power to produce.

First let us turn directly away from the molders and compare the statements of J. N. Taylor of the Chemical Division, Bureau of Foreign & Domestic Commerce, with the statements of the Government as set forth in Table 13, Group VIII of the Industrial Census for 1925. Mr. Taylor's figures were given in the October first issue of "Chemicals," and are in part as follows: "In 1925 according to the Bureau of the Census, the total production of pyroxylin materials, exclusive of amounts made and consumed in establishments reporting, amounted to $75,987,000 (A), of which $48,732,000 (B) worth constituted pyroxylin plastic solids and $27,255,000 were pyroxylin lacquers, enamels, thinners, and solutions."

Mr. Taylor undoubtedly arrived at figure (A) by using the Census, since he refers to it, and if we do likewise, we must attempt to get the same results he did. We therefore combine the following in our attempt: (The headings are taken verbatim from the Census).

I

Total value of Pyroxylin, including collodion	$38,861,945
Value of Plastics for sale in form for further manufacture	13,720,802
Value of Solutions (not including production by paint and varnish factories)	14,156,889
Value finished articles of pyroxylin	10,984,254
Total	$77,723,890

II

Value of plastic products	$48,731,957
Total value of Pyroxylin, including collodion	38,861,945
Total	$87,593,902

III

Value of plastic products	$48,731,957
Value of plastics for sale in form	

Novel Fountain Has Molded Plunger

BY novel arrangement of a glass syphon and a Bakelite plunger, this unique dispenser for fruit drinks cleverly draws the liquid and a crowd at the same time.

When not in use, a fountain of juice spouts from the center of the base to the top of the glass bell, distributing it down the sides. When a customer orders a drink, the plunger is pressed and the inside end of the glass tube impinges on the stream of liquid and out of the syphon the diverted stream is forced into the cup.

The arrangement was made primarily to avoid contact of metal with fruit drinks. The transparent synthetic resinoid fittings are easily washed and do not tarnish, being chemically inert. They also add an attractive feature to the dispenser. A bushing of the same material is also used in the center of the fountain to direct the stream.

The first night this machine was in use over 40 gallons of the beverage were sold, giving some indication of the unexpected sales value of this type of dispenser.

*Reprinted from Printers Ink

for further manufacture	13,720,802
Total	$62,452,759

IV

Value of Plastic products	$48,731,957
Value of plastics for sale in form for further manufacture	13,720,802
Value of solutions (not including production by paint and varnish factories)	14,156,889
Total	$76,609,648

V

Value of plastics products and of plastics for sale in form for further manufacture	$62,452,759
Value of finished articles of pyroxylin made in the producing establishments	10,984,254
Total	$73,437,013

VI

Total value of pyroxylin, including collodion	$38,861,945
Value of plastics for sale in form for further manufacture	13,720,802
Value of solutions (not including production by paint and varnish factories)	14,156,889
Value of finished articles of pyroxylin made in the producing establishments	10,984,254
Value of other plastics (phenolic resins, rubber substitutes, casein plastics, etc.)	9,870,012
Total	$87,593,902

Since these are the only available financial figures in the report, and since no combination of them corresponds to Mr. Taylor's figure, it is evident that the government and its agent differ by almost a million dollars at least. One may also express wonder as to the difference in definition of the $48,732,000 figure (B). Mr. Taylor refers to it as "pyroxylin plastic solids", and previously defines pyroxylin as materials including "trade names such as celluloid, pyralin, viscoloid, fiberloid, zylonite." Therefore it would be reasonable to assume that the figure (B) pertains to a well defined pyroxylin group. The government, on the other hand, defines (B) as "value of plastic products", and speaks of plastics as "phenolic resins, rubber substitutes, casein plastics, etc".

In the above we do not wish to imply that Mr. Taylor is in error, but that certainly either he or the government is. When two sets of information, from almost the same official source, are so different, it either is because of error in computation or compiling, or lack of co-ordination, and is certainly to be regretted. The government may not know, or care, about such dissention, but we call it to its attention, hoping that if we are wrong they will correct us, though it is virtually impossible to go wrong with such scant information; believing that if we are right some action should be taken. It is no wonder that there are rumors about plastic business that are untrue when even official sources fail to check properly!

There are several other figures that might be questioned in Mr. Taylor's article when they are compared to the only available government statistics. He may possibly have access to other official information bureaus, and if so is to be complimented.

(*Continued on page 704*)

NEW BRITISH RESIN

THE British Cynanide Company (connected with Imperial Chemicals, Ltd.) is reported as having issued license rights to Rhenish Westfaelische Sprengstoff Aktinegesellschaft, Cologne, (closely connected with the I. G.) to manufacture synthetic resins. It is said that profits will be equally shared by the two companies. The British Cynanide Co. will deliver materials entering into the manufacture of the product. A similar arrangement between this company and an American company is said to have been effected.

Lucite Display Room

A MODERNISTIC display room has been installed at the showrooms of the Du Pont Viscoloid Co., 330 Fifth Avenue, New York. It was designed by Leslie S. Janes, specialist in window display and decoration.

In order to emphasize the merchandise on display, which in this case was the new LUCITE toiletware, the entire room was studied in order to develop the most adequate effects in Art Moderne application.

Dark gray material in narrow vertical pleats was used on the walls as a background, the top of the pleating or crown being finished with a three member molding of copper and white metal. The baseboard was done in black DUCO. Two large parchment lighting planes were suspended from the ceiling of the room, each having three various size layers swung one below the other on brass chains. All panel moldings and outer frames of these units were

(*Please turn to page 712*)

Now to begin anew our industrial report, in 1923 the total value of plastic products, non-inclusive of photographic films of cellulose, nitrate and acetate, was $102,229,807, and the corresponding value in 1925 was $136,739,830 or an increase of $34,510,023 (approximately 34%). This would seem to show a 17% increase in the years 1924 and 1925 as compared to 1923, and, if, the same percentage is taken into consideration from 1925 to 1928, the proportionate increases in value would be as follows:

1926	$159,985,601
1927	$187,183,153
1928	$219,004,289

or a total increase over the three years of $82,264,459!

Tariff a Factor

It is, of course, basically unsound to assume that the 17% increase of 1925 over 1924 has prevailed yearly since that time, and a little further on we shall discuss the more reasonable figures. The 34% increase from '23 to '25 does, however, offer some possibilities for consideration. What, in the main, was responsible for such a phenominal gain? Was it the election of 1924? Possibly, but it is more probable that the election was only a minor cause, and that the whole crux of the situation lay in the almost absolute embargo on some forms of plastic material. This embargo, high tariff, or whatever it may be called, had a stimulating effect on every phase of the industry, and outsiders noticing the growing National demand, immediately formed into competitive organizations. Since competition is the life of trade, it is no wonder that such competition was the life of the plastic group. You may well question the above by replying, "what about the high tariff previous to 1924?" and "what about Argentine casein imports?" The tariff rate previously did boom the industry, but it remained for the "discouragement" tariff, as one Congressman has phrased it, to stimulate a really high production, and Argentine did not begin to have a large Casein trade until 1926 when it supplied 2/3 of the international trade, and has, in the first five months of 1928, imported into the United States, approximately 34½ tons per day (69,000 lbs).

The Weakness of Figures

In terms of molding profit the figures are less imposing, and as they would most certainly be open to disagreement we shall not devote time or space for them here. The year of 1925 saw profit as did 1926. 1927, however, as well as this past year, have seen a lowered profit in some sections of the country, and it is only in the past three months that any perceptible rise has been noticed in the field, and especially among the molding concerns, who have been troubled with more small volume orders than ever before.

How true it is that one cannot depend on figures! The only available industrial census statistics on plastic products which are discussed in detail at the beginning of this article and from which the above 1923 and 1925 figures are taken, do not only include in their totals the visca, cellophane, artificial silk (Rayon), and collodion, but do not even attempt to break up the classification under such desirable headings as "phenolic resins", "furfural" or "casein", and therefore, just to be helpful, almost everybody advances a set of figures for this group, and few of the figures are at all similar. The government evidently regards the plastic industry as having too small an output, and therefore does not collect any informative data. This, in a field well over the $100,000,000 mark, is to be regretted, for it not only tends to strengthen false rumors, but it gives that wrong impression of secrecy to so many outside interests. It is undobutedly a retarding influence, and if some of the manufacturers could be brought face to face with a government survey, they would feel more inclined to investigate the possibilities of plastics in their own output. *Plastics, however, has reason to believe that with correct co-operation and organization in the field, the Department of Commerce will consider inaugurating monthly reports on production and consumption.*

Suppose, to begin with, we advance a 13,000,000 pound figure, one that has already been given—this seems to divide up in this manner; 10,000,000 for phenolic resins and 3,000,000 for the rest of the entire output of casein, furfural, etc. Obviously, these figures are low, and therefore we conducted a little survey ourselves. Two eastern authorities, one of them unprejudiced and the other connected with the "minority" group, agreed on a 12 million to 6 million ratio, and two western men went about a million higher in phenol and one lower in the second grouping. At least the figures given show a hopeful attitude, and to say that there had been a 20% gain since 1925 would be a conservative estimate.

Conditions Poor

To return to the molders, the following questions were asked of (I) a large eastern button concern, (II) a custom molder of comparatively large production, and (III) a well known producer of molding power:

1. What is the percentage of gain or loss in the volume of business for the first eight months of 1928 as compared with the first eight of 1927?
2. What do you look for in the last four months of the year?
3. What is the outlook for 1929?
4. How do this year's costs compare with last year's?
5. How do your profits compare?
6. Do you believe the *molding* industry has gained this year compared to the gains which have prevailed in practically all other industries?
7. To what do you ascribe the conditions existing in your industry?
8. Is it now financially attractive?
9. What do you suggest to help

(*Please turn to page 710*)

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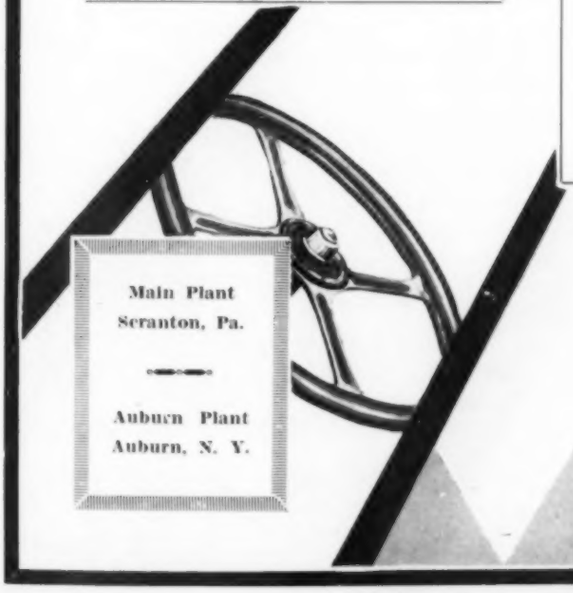

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AND NOW AFTER THREE YEARS

THIS publication treats of the history, technique and distribution of a complex and rapidly growing industry. In October 1925 it set out on its purpose as outlined on page 674. It has always been independent of subsidy, free from any connections that might lessen its sincerity, and chiefly shaped and guided by its present Editor, Mr. Carl Marx.

Few journals that face in their fourth year the demands of such a situation as now surrounds PLASTICS can be spoken of as having fully arrived, or as meeting most usefully the requirements of their readers. To the publishers of PLASTICS such results are still but their major purpose. To the readers of this magazine they are a steadily increasing need. Only from a close co-operation between the readers and the editors and publishers, can the most ideal benefits from such a medium be made permanent.

From the publishers, who are constantly working towards this end, this statement should rightly be one of the present opportunity, through PLASTICS, to extend the influences, the progress and the knowledge of our readers toward the mutual benefit of the industry. This is the call from PLASTICS to its clientele of readers at the turn of the year,—and January will be the fortieth issue of this, the only English-printed plastic journal! Such extended cooperation would mean much more to you and to the future of your enterprises than would any recital of our growth, the goodwill we enjoy, the accomplishments of help we have to our credit, or of the steadfastly growing circle of followers that PLASTICS has created. Suffice it to say that PLASTICS has answered the call for an open meeting place. It has tried to do as much as any single herald could, in a new and changing industry; to inform, to warn, to advise. It is working to do it better at this time and is today reaching more intimately over twice as large a total of workers in its field, as made up its family three years ago.

So, if you want to help PLASTICS become more helpful to you, keep in touch with it. Tell us your problems, answer our own, criticize our position if you must. and bawl us out if you can! PLASTICS has a flair for exactness and wants to be set right if it slips. Its greatest strength today is in the closeness which relates it to many contributing and corresponding sources. Its greatest hope tomorrow is to come into more useful contact with many more of them. It again urges each reader not to forget that cooperation will help spell his success, as well as our more successful service to him.

THE PUBLISHERS.

A Board of Advisory Editors, but recently proposed, is given herewith. Attention is called to the fact that the names indicate, for the most part, a tendency to break up into different occupational lines in the same field, and it is felt that their names, as well as the articles which some of them will contribute, will not only be of interest but, in the last instance, of instruction to our readers. Future articles, not alone from the pens of these gentlemen, but from others equally well equipped, are certain to be of extreme importance. Additional names will be added to this Board as opportunity permits, and PLASTICS again expresses its appreciation to those present members. In fact, every indication is given that the coming year will see a vast improvement in editorial content, and in real value to you.

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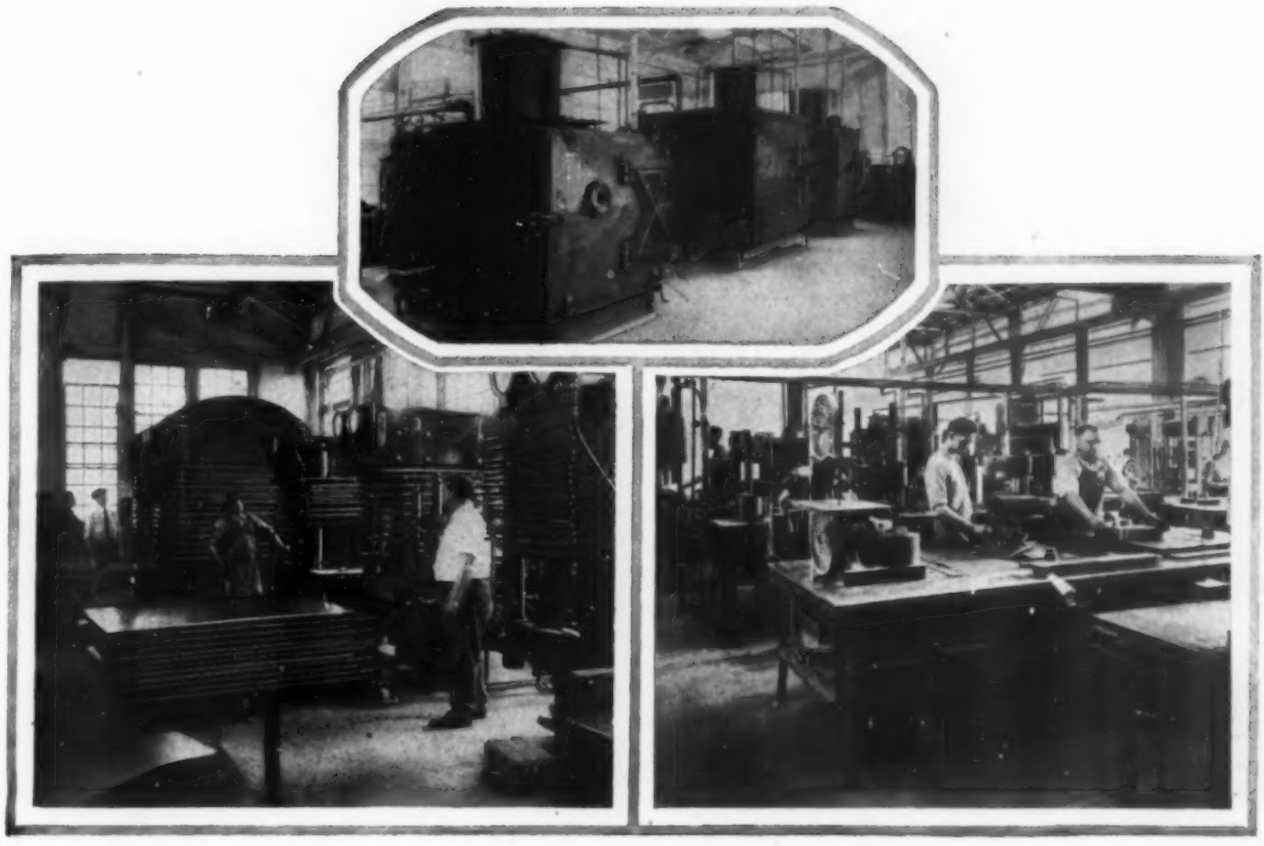

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Molders Association Holds Mid-West Meeting to Adopt Trade Standards

The Molded Insulation Section of the National Electrical Manufacturers' Association met at the offices of the Kurz-Kasch Company in Dayton, Ohio, on November 14. Mr. C. H. Kurz, Jr., was host to the section, and after the official business had concluded, invited all the members to his home on the outskirts of the city for dinner and informal discussion. The actual business meeting occupied the morning, and after a luncheon in the restaurant adjoining the property, Mr. Kurz conducted a personal tour of the plant. This feature of the meeting was very favorably spoken of by all of the 20 men present, and many of them received ample instruction to reward them for their time spent.

It is sincerely hoped that, in all future meetings, the spirit and cooperation that were so prevalent at Dayton may continue. The entire meeting was conducted with a combination of efficiency and helpfulness that is seldom noticed among competitors, and a great deal of credit must be given to Mr. Kurz and Mr. Clarkson for any results that may come from it. An official report follows:

Members Present

American Insulator Company, P. Huidekoper, Assoc.

Belden Manufacturing Co., L. I. Stratton, Proxy.

Chicago Molded Products Co., E. F. Bachner, Exec.

General Electric Company, H. D. Randall, Assoc.

Norton Laboratories, Inc., J. B. Neal, Exec.

Northern Industrial Chemical Co., B. E. Schlesinger, Exec.

Members Absent

Alden Manufacturing Co.

A. & J. M. Anderson Manufacturing Company.

Bryant Electric Company.

Connecticut Molded Products Corporation.

Cutler Hammer Manufacturing Company.

Garfield Manufacturing Co.

Johns-Manville Corporation.

Shaw Insulator Company.

Others Present

Chicago Molded Products Company—F. J. Bachner, J. B. Bolin, W. T. Kelley.

Kurz-Kasch Company—H. J. Kasch, C. J. Terrell.

International Insulator Co.—P. R. Seigfried.

Reynolds Spring Company—J. W. Lougheed, C. J. Goodrich.

Schneider Brothers, Inc.—Mr. Schneider, Mr. Hallinbeck.

Plastics Magazine—R. C. Gilmore, Jr.

NEMA—S. N. Clarkson.

Presiding Officer — C. A. Kurz, Jr., Chairman.

Trade Practice Conference

Mr. Kurz said that it was decided at the last meeting to request the Federal Trade Commission to call a trade conference of the molded industry. He said he had written a letter to the Commission for Mr. Clarkson to deliver in Washington, and he asked Mr. Clarkson to report.

Mr. Clarkson first suggested that every member write to the Federal Trade Commission, Washington, D. C., for reports of the trade conferences of the millwork industry and the flat glass industry.

Mr. Clarkson said that Mr. Kurz' letter had not been left with the Commission as before the Commission can act on the request for a trade conference, they want to know some of the practices which the industry wants endorsed or condemned. In this connection it is necessary that at least one unfair trade practice be included but the industry is neither bound nor limited by the list of practices submited in this way.

Mr. Clarkson said that the Commission divided the trade practices into three groups, as follows:

1. Unfair trade practices which can be affirmatively approved by the Commission.
2. Other practices which may be accepted by the Commission as expressions of the trade.
3. Proposed practices which the Commission disapproved.

Mr. Clarkson was unanimously requested to ask the Federal Trade Commission to call a trade conference of the molded industry and that the following rules (taken from the flat glass conference) be presented, in addition to the practices adopted at the last meeting of the section.

Rule 1.—Inducing Breach of Contract

The wilful interference by any person, firm, corporation or association, by any means, or device whatsoever, with any existing contract or order between a seller and a purchaser. in or about the production, manufacture, transportation purchase or sale of any product handled by the industry, or the performance of any contractual duty or service connected therewith, such interference being for the purpose or with the effect of dissipating, destroying or appropriating, in whole or in part, the patronage property or business of another engaged in such industry, is an unfair trade practice.

Rule 2.—Misbranding

The marking or branding of products of the industry for the purpose or with the effect of misleading or deceiving purchasers with respect to the quality, quantity, grade or substance of the goods purchased, is an unfair trade practice.

Rule 3.—Fraud and Misrepresentation

The sale or offering for sale of any product of the industry

with intent to deceive customers or prospective customers as to the quantity, quality, substance or size of such product, is an unfair trade practice.

Rule 4.—Unbranded Products

The sale or shipment of molded products not branded or marked to indicate their true character, in accordance with accepted standards of the industry, is an unfair trade practice.

Rule 5.—Secret Rebates

The payment or allowance of secret rebates, refunds, credits or unearned discounts, whether in the form of money or otherwise, or the giving of premiums, of extending to certain purchasers special service or privileges not extended to all purchasers under like terms and conditions, is an unfair trade practice.

Mr. Schlesinger read the resolution on trade practices adopted at the previous meeting.

All arrangements with the Federal Trade Commission, including time and place of the conference, were left in Mr. Clarkson's hands.

Water Marks

Mr. Clarkson read the names of the concerns who had sent in water marks. All those present who had not done so agreed to have their water marks in Mr. Clarkson's hands within a week.

Generic Name Contest

Mr. Kempton reported that NEMA Publicity Department was getting all possible publicity for the contest and that about fifty names had already been received.

An announcement had been sent to all member companies that they put this in their factories. This had not been done by all companies, even in the Molded Section.

Tests

Mr. Kempton reported that the work of establishing test methods for molded products is being carried on by the American Society for Testing Materials and he wanted the section to decide whether or not it was willing for the A. S. T. M. to do this work or whether the section desired to do the work

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Accuracy . . .
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For parts that are outstanding examples of custom molding; for service that insures the most exacting attention to every detail of every job.

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If you are in the market for molded articles, we would like to send you representative pieces of our work. Your request will receive our immediate attention.

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YOU may be making switch bases, you may be making extension plugs, you may be making lamp fixtures, you may be making almost anything—*But*—if you're having trouble with any parts, if you're developing any part, try us with a sample.

It costs you nothing but postage to send a sample, blueprint or model. We'll be glad to study it, and make recommendations as to how this trouble may be eliminated, or how the part may be improved.

CETEC parts are molded exactly to form. That facilitates your assembly. Metal inserts are incorporated where necessary. CETEC parts require no machining, drilling or fitting. They have high tensile strength, high transverse strength, dielectric resistance to meet almost any need, and are practically fireproof. They save you service trouble and cost.

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CONNECTICUT
MOLDED PRODUCTS CORPORATION
MERIDEN, CONN.

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Give us full information about CETEC and its use in the following parts:

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itself. Mr. Kempton recommended, however, that the section permit the A. S. T. M. to do the work, inasmuch as it had available good laboratory facilities and one of the men connected with his organization is active in the work.

Mr. Kempton's recommendation was unanimously accepted and he was requested to keep in contact with the work in the A. S. T. M.

Bids on Closed Transactions

Inasmuch as Mr. Ott, Chairman of this Committee, was not present, it was decided to permit this to go over to the next meeting.

Equalization of Traveling Expenses

Subject to ratification by the Board, it was unanimously decided that the traveling expenses of members attending section meetings be equalized under the plan already presented, and starting with the next meeting.

Western Group

Mr. Kelly, Chairman of the Western Group, reported that they had had a very successful meeting in Chicago on October 10th and he hoped that as many of the eastern members as possible would be able to attend their next meeting.

Eastern Group

Mr. Randall said he had not yet called a meeting of the eastern group but would arrange to do so before the next meeting of the section.

B. E. SCHLESINGER,
Secretary.

(*Continued from page 704*)

remedy present conditions?

10. Is the industry generally advancing?

The replies were as follows:

(I)

1. About 10% under.
2. We do not look for any improvement.
3. We consider that the industry will do well to produce on the same level as 1928.
4. Costs a trifle higher.

5. Percentage of profits a trifle lower.
6. No.
7. The industry is over equipped. There are far more plants in operation than there is business to be given out.
8. About the only remedy is the appointment of someone as consul for the industry to make manufacturers realize the folly of taking on business of any price simply for the sake of getting it without regard to cost.

II

1. 10% greater.
2. Better than first eight mos.
3. Excellent.
4. Lower.
5. About the same.
6. Yes.
7. Better conditions are due to larger fields. Business not particularly financially attractive.
8. An association of interests would certainly remedy a number of bad features and help the industry.

III

1. About five times greater.
2. Outlook is comparable to No. 1.
3. Difficult to say definitely. We expect to make great efforts and increase our total volume.
4. Slightly higher.
6. Gained materially. Many new fields have opened up.
7. Lower prices of molding compound have opened up new avenues to increase the amount of molding being done.
8. Any suggestions to help remedy conditions would entail considerable discussion. We believe that the industry is advancing rapidly.

In connection with the foregoing, we wish to emphasize the fact that all three of these concerns are substantial, well known firms. Their reports are exceedingly difficult to use as a basis for exact figures, but the general feeling seems to be as of number 1. The remedy for this state of affairs rests with the field itself. By secrets, unfair practices and competition they have hurt the business; is it not

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precision

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You can turn your molding problems over to Norton with every confidence that the finished parts will be absolutely accurate to specifications.

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Custom Molders of Durez and Bakelite
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HARD RUBBER GOODS
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For Many Years
WE SOLICIT YOUR INQUIRY
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A novel heating plug molded in clear detail.

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only reasonable to assume that profits can be made by the opposite procedure? The molders should form an organization and the raw material manufacturers should be forced to stop the current price war. If the Molded Division of the N. E. M. A. can accomplish its purpose with the Federal Trade Commission, the price war **will** stop. We confidently expect this to happen and consequently look for increased business in the near future.

Lucite Show Room

(*Continued from page 703*)

finished to represent brass and white metal. The entrance to the room is a door covered with silver Fabrikoid applied in elongated wedges with the texture of the fabric alternated to create distinct tones of silver.

Eight display tables finished in a dull mottled green, black and imitation white metal were arranged along the walls. Each table was designed to accommodate three sets and several odd pieces of the new LUCITE accessories. The central set is elevated on removable pedestals. Due to this elevated set and also to open box lids, the tops of these tables are below regulation table height. In order to form a background for the display and to serve as a support for the table lighting, these units have back panels which curve in from the table line and rise to approximately six feet where each unit is finished off with crown lighting. These lighting units project in a semi-circular manner and are faced with small half round members finished to resemble white metal. Opal glass panels on the underside evenly distribute the flow of light on the merchandise. The top piece of each lighting unit is removable and is built up in layers with a fan-shaped ornament. As a medium for finishing the table tops and back panels silver Fabrikoid was employed.

THE Directors of the J. P. Devine Manufacturing Company, Inc., at a special meeting of the Board held on November 11th at Buffalo, elected Charles P. Devine, President of the Company. Mr. Devine fills the vacancy caused by the recent death of his father, the late J. P. Devine, founder of the organization and universally recognized as one of the leading and most successful pioneers in the process field.

R. K. Weber, who succeeded the late W. C. Arthurs as Chairman of the Board, announced also the election of H. H. Cust, Vice President; C. W. Reynolds, Secretary; and D. P. Settlemore, Treasurer. David C. Arthurs and P. J. Cooney were elected to the Board of Directors and Mr. Cooney was appointed Assistant to the President.

How You Can Use Modern Plastics

(*Continued from page 699*)

soften nor melt, nor even dissolve in any of the common solvents such as alcohol, gasolene or ether. However, these substances DO these unexpected things. Today the carbolic acid (or phenol) resins form the backbone of a tremendously important industry—the molding of millions of hard infusible strong objects that form parts of countless industrial devices of such diversified a nature as radio sets, telephones, airplane propellers and the moving-picture cameras.

Other Artificial Resins

Spurred on by the success made by the phenol resins, inventors turned their attention to other substances, and a long list of materials was thus brought into being. Many of these materials bear unusual names difficult to understand, such as Aminoplastics, Urea-formaldehyde plastics, Pollopas, Beatl-ware etc. It is no wonder that the average purchasing agent or production manager gets confused when he is offered all kinds of molding materials under such diversified names.

Anything Molded of Bakelite
A few interesting small parts made by
THE RECTO MANUFACTURING CO.
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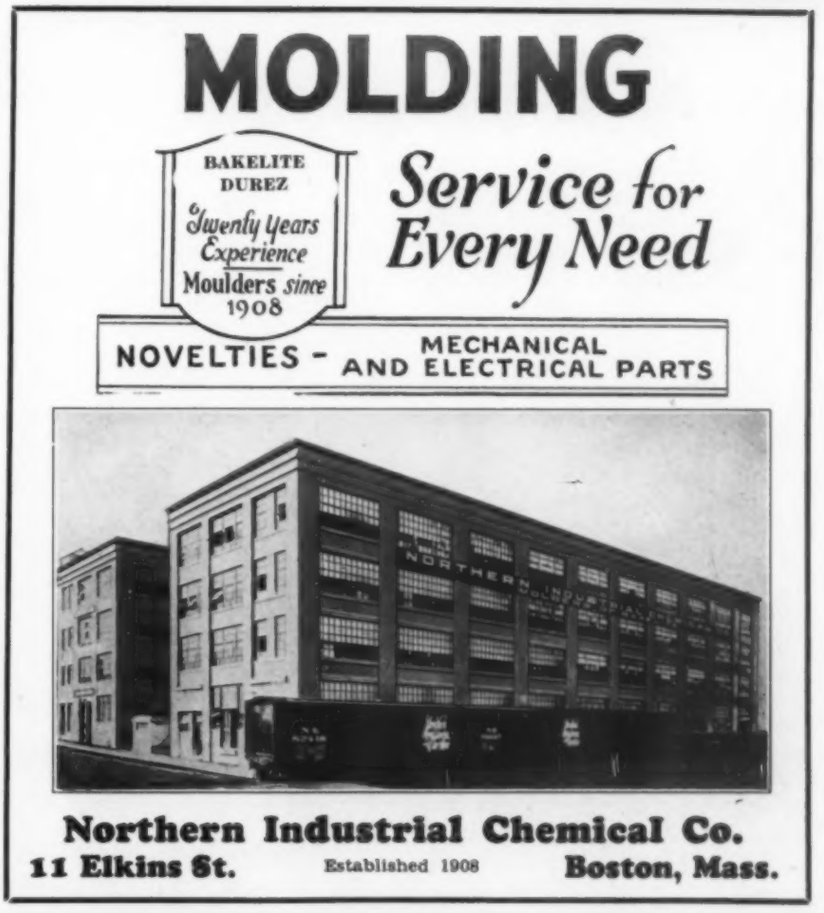

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Say you saw it in PLASTICS

The fact is that virtually all of these substances, although they may differ very fundamentally as far as their origin is concerned, will DO substantially the same thing: namely will turn from a powder into a finished object by the comparatively simple operation of squeezing the powder in a die under pressure and heat—an operation spoken of as molding. Hence the appellation "Molded Products."

The intrinsic merits and demerits of the various kinds of molding powder sold today will not be gone into. The essential feature to remember is that these powders, in order to suit their purpose must conform to three tests: first, they must be capable of becoming transformed into a plastic flowing mass when compressed and heated in the mold or die so as to flow into every nook and cranny of the mold so as to form a perfect reproduction of the same; secondly, the material, after flowing, must change over into an infusible substance so that it will not lose its shape afterwards; and, thirdly, the material must not shrink or warp when the pressure and heat is removed. A fourth property might be desired, namely that the material would not dissolve in water, alcohol, gasolene, or the like solvents. Practically every modern molding plastic conforms to all four. The prospective user therefore can safely assume that the material offered him will meet these requirements. What he has to look out for then is uniformity of molding conditions, desirable color and appearance, price, and ability to duplicate the supply of the material with a fair degree of reliability. The uses and aplications of these resins will be taken up further on.

Plastics from Milk

There is still another modern plastic material that is of great importance. It is, strange to say, made from a constituent of milk. Laymen are often astounded, and will incredulously shake their heads and smile superciliously, when informed that some perfectly stunning highly colored and polished object, that for all the world looks like exquisitely carved ivory, jade or jet, is made from the lacteal fluid of the humble cow. To the chemist, however, this fails to evoke any expressions of surprise, for he knows that the greater part of the solid material contained in milk consists of a substance known as casein. Casein is the main ingredient of cheese, and is the Latin name for the same;

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hence the name "casein." An evidence of the comparative lack of knowledge of this fact is found in frequent articles in the daily press concerning the "new" discovery of "ivory from milk." Casein solids were first made during the late eighties of the nineteenth century and reached their first perfection in Germany under the name of Galalith (Greek for "milk-stone"). Modern American casein solids are sold under a variety of trade names, but they are all basically the same thing —casein that has been hardened with formaldehyde to make it insoluble in water. Up to recently casein solids had to be made up into rods, sheets, blocks and tubes, but objects molded from casein powders have recently appeared on the market.

Casein solids, being practically incombustible, and naturally white or light-colored, have many valuable properties. Millions of buttons, shoe-buttons, mechanical pencils, fountain pens, handles and knobs of various kinds are made of these casein solids.

While not so well known, there are also other similar plastics, such as those made from various kinds of albumen-like (white-of-egg) substances. Principally among them are those made from gelatin and glue, which can be molded and then hardened with formaldehyde. There are also a number of moldable materials made from sulfur, and sulfur and rubber, and a large class of materials, especially for the cheaper kinds of products, made from pitch, asphalt, bitumen and vulcanized oils. It would obviously lead too far afield to discuss all of these various kinds, and we shall therefore proceed to discuss the obvious and also the non-obvious and suggested uses for the better known types of material. Now that you have an understanding of what these materials are, you will better be able to follow the suggestions and ideas.

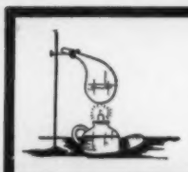
NEWS

Shellac Market Note

Shellac, in the Indian market, dropped 6 rupees when one important purchasing agency temporarily suspended payments, but bankers came to its assistance and the market recovered 3 rupees, closing steady. Total lac shipments in September reached 4,500 packages, as compared with 2,200 a year ago.

General Plastics Adds to Staff

Mr. Arthur J. Norton has joined the research staff of General Plastics, Inc., at North Tonawanda, New York. Mr. Norton formerly held an executive position with Merck and Company, manufacturing chemists, at Newark, New Jersey. Mr. Norton was previously with Powers, Weightman, Rosengarten.



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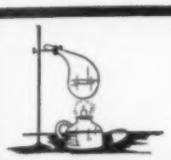

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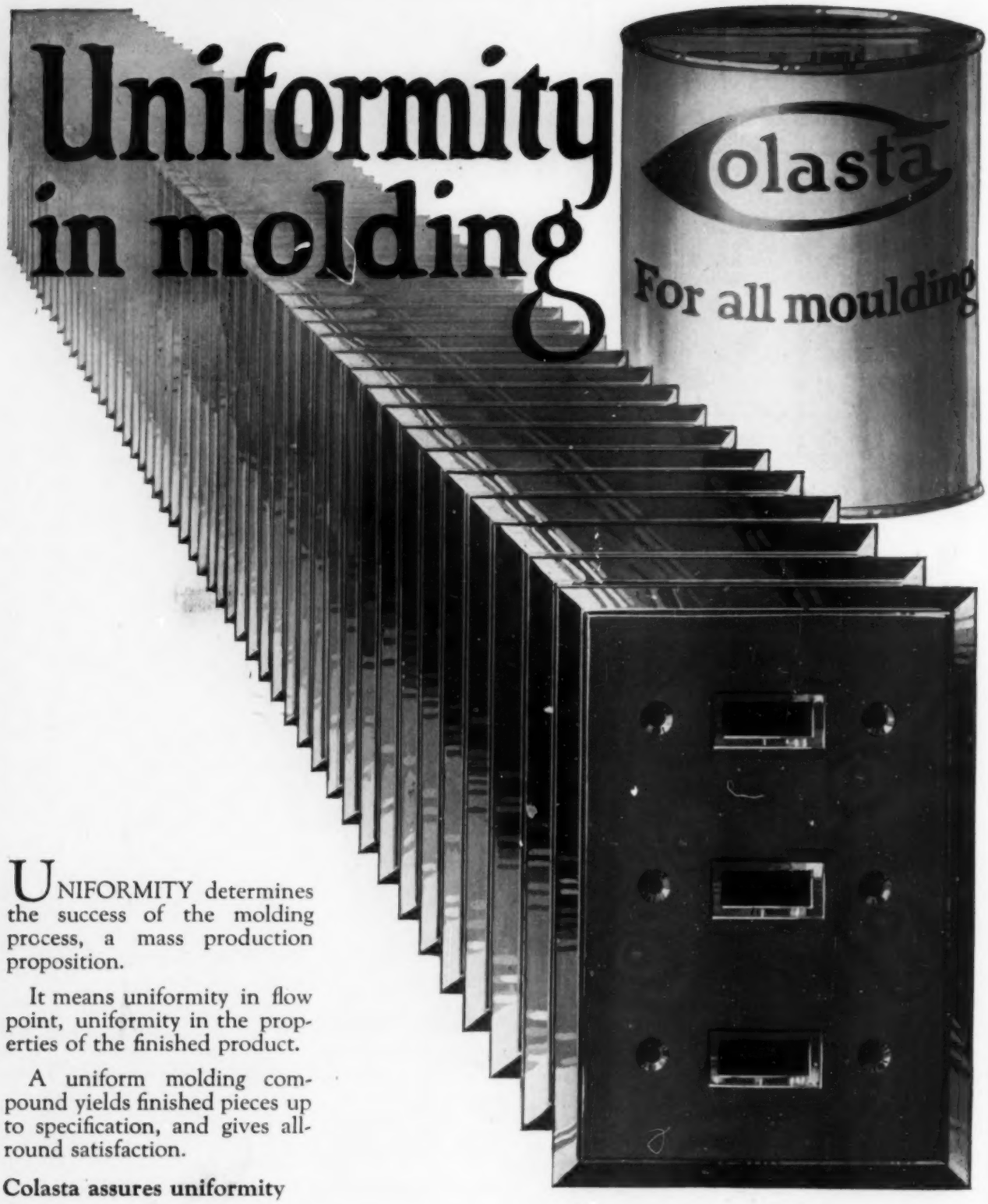

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It means uniformity in flow point, uniformity in the properties of the finished product.

A uniform molding compound yields finished pieces up to specification, and gives all-round satisfaction.

Colasta assures uniformity

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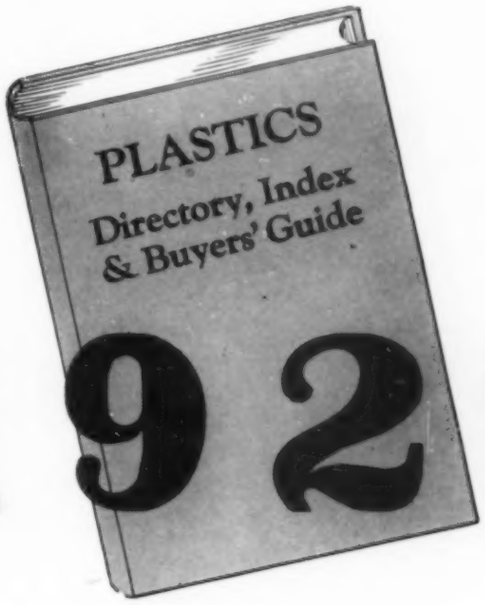

1929

THIRD ANNUAL EDITION

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This is an innovation. It has already done wonders in Lamp Shades, where its beauty and entire suitability stimulated sales from the start.

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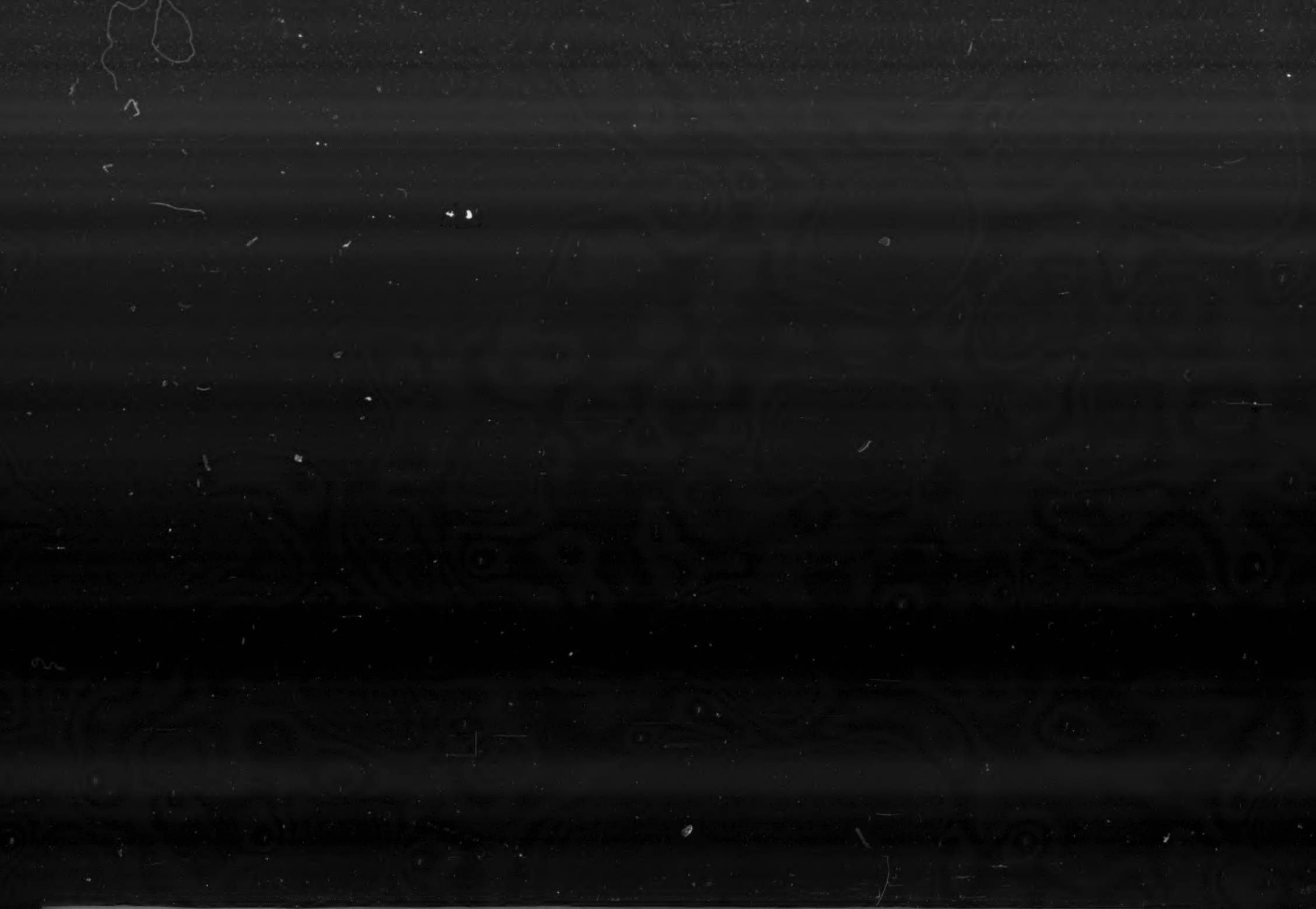
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